AFFIDAVIT OF DR. JAMES H. MATIS

State of Texas)
) ss
County of Brazos)

I. James H. Matis, being first duly sworn, testify of my own personal knowledge that:

1. My *curriculum vitae* is attached as Exhibit 2. The statements made in it are true and accurate.

2. The report attached as Exhibit 3 contains statistical analysis of the assignment of judges to the Ninth Circuit cases reflected in attached Exhibit 1. That analysis has been done in conformity with the standards governing my profession, and, in my professional and expert opinion, the report's conclusions are accurate and valid.

SUBSCRIBED AND SWORN TO before me October 13th, 2014.

COURTNEY BURGESS
NOTARY PUBLIC
STATE OF TEXAS
MY COMM. EXP. 5/20/18

Courtney Burgess
Notary Public
Residing at Brazos County
My Commission Expires: 5/20/18

AFFIDAVIT OF MONTE NEIL STEWART

State of Idaho)
) ss
County of Ada)

I, Monte Neil Stewart , being first duly sworn, testify of my own personal knowledge that:

1. I am a lawyer duly admitted to practice before this Court and am one of the lawyers representing in this case the Coalition for the Protection of Marriage.
2. My resume is attached as Exhibit 4, and each statement made in it is true and accurate.
3. This Court disclosed to the Coalition and the public on September 1, 2014, the composition of the panel assigned to hear this case (the Nevada genderless marriage case), *Latta v. Otter*, Case Nos. 14-35420 and 14-35421 (the Idaho genderless marriage case), and *Jackson v. Rosen*, Case Nos. 12-16995, 12-16998, and 12-17668 (the Hawaii genderless marriage case).
4. The Coalition's counsel became aware of concerns held by other practitioners that the Circuit's judge-assignment process in socially sensitive cases like this one appeared to deviate from the ideal of a

random or otherwise neutral process. Accordingly, we examined the Circuit's history of assignments in cases involving the federal constitutional rights of gay men and lesbians and learned that Judges Reinhardt and Berzon were assigned to such cases with a frequency that suggested to us deviation from a neutral-assignment process. We then engaged Dr. James H. Matis to refute or confirm that suggestion and, if he confirmed it, to quantify the deviation. Dr. Matis has now performed that task and confirmed that the presence of either of those two judges on this panel would constitute a statistically significant deviation from what one would expect from a neutral process. He further confirmed that if the two judges appeared together, the deviation would be materially greater still.

5. In the process just described, we compiled a list of the Ninth Circuit cases decided on or after January 1, 2010, and raising a federal constitutional issue regarding the rights of homosexuals *qua* homosexuals ("Relevant Cases"). Exhibit 1 is that list. Diligent search using the resources available to us disclosed no additional Relevant Cases in the Ninth Circuit post-2009. Exhibit 1's data for each listed case is accurate.

6. Based on my many years of scholarly work on the genderless marriage issue (beginning with my intense studies of the subject at Oxford University in 2003 and 2004), on my work with a large number of appellate courts over the decades, and on my many years of direct involvement with litigation of the genderless marriage issue, I have concluded that:

    a. experienced Ninth Circuit practitioners familiar with the genderless marriage issue would uniformly prefer this panel over almost any other possible panel *if* their client were one of the plaintiffs in the Nevada and Idaho marriage cases, and, *if* their client were on the man-woman marriage side, would very likely conclude this panel to be among the least favorable possible for their client; and

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b. such preferences and conclusions are known and understood by all at the Ninth Circuit involved with the judge-assignment process.

SUBSCRIBED AND SWORN TO before me October 13, 2014.

TOM C. MORRIS NOTARY PUBLIC STATE OF IDAHO

Notary Public
Residing at Boise
My Commission Expires: 4/4/17

Exhibit 1
Ninth Circuit Cases Involving Federal Constitutional Rights of Gays and Lesbians
(since January 1, 2010)

Case	Treatment of Federal Constitutional Issue	Members of the Panel	Published/ Unpublished	Date of Oral Argument
Kemp v. Ryan, 638 F.3d 1245 (April 28, 2011)	Habeas action in which Ninth Circuit panel rejected plaintiff's assertion that the Due Process Clause of the 14th Amendment entitled him to re-*voir dire* the jury after the trial court denied his motions in *limine* that would have barred the introduction of evidence of plaintiff's homosexual assault	Rymer, Callahan, Ikuta	Published	March 10, 2011
U.S. v. Osazuwa, 446 Fed. Appx. 919 (Aug. 12, 2011)	affirmed district court's finding that defendant failed to show purposeful discrimination by government in exercising a preemptory strike against a potential juror who was a lesbian	Reinhardt, Wardlaw, Berzon	Unpublished	Aug. 4, 2011
Diaz v. Brewer, 656 F.3d 1008 (Sept. 6, 2011)	affirmed district court's order granting preliminary injunction to prevent state law taking effect that would have terminated eligibility for health-care benefits of state employees' same-sex partners; plaintiffs demonstrated a likelihood of success on the merits because they showed that the law adversely affected a classification of employees on the basis of sexual	Schroeder, Thomas, Bennett (District Judge)	Published	Feb. 14, 2011

Exhibit 1
Ninth Circuit Cases Involving Federal Constitutional Rights of Gays and Lesbians
(since January 1, 2010)

Case	Treatment of Federal Constitutional Issue	Members of the Panel	Published/ Unpublished	Date of Oral Argument
Log Cabin Republicans v. United States, 658 F.3d 1162 (Sept. 29, 2011)	vacated district court's order permanently enjoining application of the congressionally enacted "Don't Ask, Don't Tell" policy, 10 U.S.C. § 654(b) (repealed), as facially violating due process and the First Amendment; repeal of § 654 during the pendency of the appeal rendered the case moot	Alarcón, O'Scannlain, Silverman	Published	Sept. 1, 2011
Ward v. Carr, 467 Fed. Appx. 721 (Feb. 3, 2012)	affirmed district court's dismissal of state prisoner's equal protection claim because he did not submit sufficient evidence for a reasonable juror to conclude that he was intentionally discriminated against because of his homosexuality	Wallace, Noonan, M. Smith	Unpublished	Jan. 13, 2012
Perry v. Brown, 671 F.3d 1052 (Feb. 7, 2012)	affirmed district court on basis that Proposition 8 violated equal protection clause by taking away the rights of same-sex couples to marry	Reinhardt, Hawkins, N.R. Smith	Published	Argued Dec. 6, 2010; argued again Dec. 8, 2011

Exhibit 1
Ninth Circuit Cases Involving Federal Constitutional Rights of Gays and Lesbians
(since January 1, 2010)

Case	**Treatment of Federal Constitutional Issue**	**Members of the Panel**	**Published/ Unpublished**	**Date of Oral Argument**
Barnes-Wallace v. City of San Diego, 704 F.3d 1067 (Dec. 20, 2012)	lesbian plaintiffs failed to show that by leasing public premises to the Boy Scouts, City treated them differently from other members of the public for purposes of their equal protection claims	Canby, Kleinfeld, Berzon	Published	Argued June 20, 2011
Galario v. Adewundmi, 531 Fed. Appx. 830 (June 24, 2013)	reversed district court's denial of summary judgment because plaintiffs had failed to provide sufficient evidence to raise a triable issue of fact as to allegations that state social worker harbored discriminatory animus toward them on the basis of their sexual orientation and that due to that animus he recommended that the state remove a child from their home	Farris, D.W. Nelson, Nguyen	Unpublished	No oral argument; deemed submitted June 11, 2013

Exhibit 1
Ninth Circuit Cases Involving Federal Constitutional Rights of Gays and Lesbians
(since January 1, 2010)

Case	Treatment of Federal Constitutional Issue	Members of the Panel	Published/ Unpublished	Date of Oral Argument
Golinski v. United States Office of Personnel Mgmt., 724 F.3d 1048 (July 23, 2013, corrected July 25, 2013)	order dismissing appeals; Golinski, a 9th Circuit staff attorney, pursued administrative remedies under EDR plan to secure federal benefits for same-sex spouse and then filed suit in federal court contending § 3 of DOMA was unconstitutional; district court ruled § 3 of DOMA unconstitutional, which was appealed; parties stipulated to dismissal of appeals in light of U.S. Supreme Court's decision in *Windsor*	Alarcón, Thomas, Berzon	Published	No oral argument; appeals dismissed
SmithKline Beecham Corp. v. Abbott Labs., 740 F.3d 471 (Jan. 21, 2014)	concluded that the appropriate level of scrutiny for reviewing equal protection claims related to sexual orientation discrimination is "heightened scrutiny"; held that use of preemptory strike to remove juror based on sexual orientation constituted intentional discrimination which was prohibited by *Baston*; reversed district court	Schroeder, Reinhardt, Berzon	Published	Sept. 18, 2013

Exhibit 1
Ninth Circuit Cases Involving Federal Constitutional Rights of Gays and Lesbians
(since January 1, 2010)

Case	Treatment of Federal Constitutional Issue	Members of the Panel	Published/ Unpublished	Date of Oral Argument
Jackson v. Abercrombie, Nos. 12-16995 & 12-16998; *Sevcik v. Sandoval*, No. 12-17668; *Latta v. Otter*, Nos. 14-35420 & 14-35421; Decision in Idaho and Nevada cases: *Latta v. Otter*, 14-35420, 2014 WL 4977682 (9th Cir. Oct. 7, 2014)	concluded that Nevada's and Idaho's laws preserving marriage as the union of a man and a woman violated the Fourteenth Amendment's equal protection clause;	Reinhardt, Gould, Berzon	Published	Sept. 8, 2014

January 2014

CURRICULUM VITAE

Name: JAMES H. MATIS
Address: 1908 Bee Creek
College Station, TX 77840

DATE AND PLACE OF BIRTH: March 3, 1941, Chicago, IL

EDUCATION:

1970	Ph.D., Statistics; Texas A&M University; College Station, TX
1967	M.A., Statistics and Mathematics; Brigham Young University; Provo, Utah
1965	B.S., Mathematics and Economics; Weber State College; Ogden, Utah

SUMMARY OF CAREER:

- Prof. Matis is a Fellow of the American Statistical Association (ASA), and an elected Member of the International Statistical Institute. He received the Founder's Award, the highest honor of the ASA, for "outstanding leadership ... advancing statistics education." He also received Distinguished Achievement Awards in both Teaching and in Research from Texas A&M University.
- Concerning research, Prof. Matis has published over 140 scientific papers. Many of these represent interdisciplinary research, and they appear in over 40 different journals.
- Concerning teaching, Prof. Matis has chaired education committees for the American Statistical Association and has served as a faculty consultant for the national Advanced Placement (AP) exam in statistics since its inception in 1997.
- Concerning consulting, Prof. Matis has been engaged in statistical consulting for other disciplines, especially for animal science and entomology, at Texas A&M throughout his career. He has also been a consultant for business and government agencies.
- Prof. Matis' international experience includes service as a statistical expert for the UN Food and Agriculture Organization (FAO) to India twice and to PR China once. He was awarded a Fulbright exchange research fellowship from the US State Department to India twice, and was awarded an Indo-American fellowship once. He has also taught in South Africa.

EXPERIENCE:

Academic:

2000-	Professor Emeritus, Statistics, Texas A&M University
2008-2010	Professor, Department of Statistics and Department of Agricultural Economics, Damascus University, Damascus, Syria
1997-2008	Faculty Consultant, ETS Advanced Placement Reading in Statistics
1996-2005	Director, TAMU Advanced Placement Summer Institute in Statistics
2001	University Research Scholar, Indian Institute of Technology, Madras, India (Spring)
1979-2000	Professor, Statistics, Texas A&M University
1995	Visiting Research Scholar, Indian Institute of Technology, Madras, India (Fall)
1988	Visiting Professor, Statistics, University of Kentucky (Fall)
1986	Statistical Consultant, United Nations Development Project; Chinese Academy of Agricultural Sciences, Beijing, China, (Spring)
1985, 1986	Statistical Consultant, United Nations Development Project; India Ag. Stat. Research Inst., New Delhi, India, (Summer 1985, Winter 1986)
1984	Visiting Professor, Statistics; Indian Institute of Technology, Madras, India, (Spring)
1981	Visiting Professor, Statistics; University of Witwatersrand, Johannesburg, South Africa, (Summer)
1978-1979	Visiting Associate Professor, Biomathematics, North Carolina State University
1974-1979	Associate Professor, Statistics, Texas A&M University
1974-1975	Visiting Associate Professor, Statistics, Pennsylvania State University
1970-1973	Assistant Professor, Statistics; Texas A&M University
1967-1970	Teaching Assistant, Statistics, Texas A&M University
1965-1967	Teaching Assistant, Statistics, Brigham Young University
1964-1965	Teaching Assistant, Mathematics, Weber State College

Exhibit 2

Industrial:

1989-2003	Faculty Member; USDA Food Safety and Inspection Service; College Station, Texas
1976-1986	Consultant; Coca-Cola Company Foods Division; Houston, Texas
1983-1986	Statistician; National Marine Fisheries Service, NOAA, Galveston, Texas
1976-1980	Expert; Division of Biometrics, Bureau of Drugs, FDA
1980	Consultant; Ecological Simulations, Inc.; Athens, GA (Summer)
1975-1978	Consultant; Los Alamos Scientific Laboratory, New Mexico
1965-1967	Mathematical Statistician; U.S. Forest Service; Ogden, Utah; part-time and summers

HONORS AND AWARDS:

2012	Best paper in Statistical Methodology during 2010-2011. *Journal of Indian Society of Agricultural Statistics*
2003	Founders Award, American Statistical Association, 'for outstanding leadership... advancing statistics education.'
2001	Fulbright Research Scholarship to India, U. S. Department of State.
2000	Member, Academy of Distinguished Graduates, College of Science, Texas A&M University.
1998	Distinguished Achievement in Research Award, Texas A&M University, Association of Former Students
1998	Donald B. Owens Award, San Antonio Chapter of ASA
1997	Honored Alumni Award, College of Physical and Mathematical Sciences, Brigham Young University.
1996-2006	Visiting Professor, Department of Statistics and Modelling Science, University of Strathclyde, Glasgow, Scotland.
1995	Fulbright Research Scholarship to India, U. S. Information Agency
1994	Distinguished Statistical Ecologist award, International Association for Ecology (INTECOL)
1993	Distinguished Achievement Medal, Section of Statistics and the Environment, American Statistical Association
1993	Distinguished Achievement Award in Teaching, University level, Texas A&M University Association of Former Students.
1989	Elected Member, International Statistical Institute
1987	Fellow, American Statistical Association
1985	Distinguished Teaching Award, College of Science, Texas A&M University Association of Former Students
1984	Indo-American Research Fellowship, U.S. Educational Foundation in India
1980	H. O. Hartley Award, distinguished former student, Texas A&M University
1975-1980	NIH Research Career Development Award
1969	Connor Statistics Award, outstanding Ph.D. candidate, Texas A&M University
1967-1970	National Defense Education Act Fellow
1965-1967	National Science Foundation Trainee
1959	Outstanding Freshman Mathematics Student, Weber State College

PROFESSIONAL ACTIVITY:

2006-2008	Organizer, Statistical Papers Night at National AP Statistics Reading
2004	Member, Outreach Magazine Task Force, American Statistical Association
2002-2003	Member, ASA Magazine Task Force, American Statistical Association
2001	Program Chair, Statistical Education Section, American Statistical Association
1999-	Coordinator for Beyond AP Statistics (BAPS) Program for American Statistical Association
1998-2004	Member, American Statistical Association and National Council of Teachers of Mathematics Joint Committee on the Curriculum of Statistics and Probability (Chair--2000)
1996-2001	American Statistical Association representative to SRCOS Summer Research Conference Committee (Chair 1997, 2000)
1996-1998	Chapter Representative, Southeast Texas Chapter of ASA (SETCASA)
1994-1995	Publications Officer, Section on Statistics and the Environment, Am. Stat. Assoc.
1989-1993	Member, Am. Stat. Assoc. Review Committee for Ecological Monitoring and Assessment Program (EMAP)
1989-1992	Publications Officer, Section on Statistical Education, American Statistical Association

1988-1991	Member, Committee on Meetings, American Statistical Association (Chair---1990)
1987	Member, Organizing Committee, NATO Advanced Study Institute on Pharmacokinetics, Erice, Italy
1987	Program Chair, 1987 Joint Statistical Meetings, American Statistical Association
1979-1984	Member, Committee on Meetings, American Statistical Association (Chair---1984)
1983	Program Chairman, Statistical Education Section of American Statistical Association.
1981-1983	Member, Regional Council, Biometric Society (ENAR)
1979-1982	Member, Executive Board, International Statistical Ecology Program
1980	Program Co-chairman, 1980 Spring ENAR Meetings, Biometric Society
1978	Coordinator and Organizer, NATO Advanced Study Institute on Compartmental Models Analysis in Ecology, International Statistical Ecology Program; Parma, Italy.
1977	Local Arrangements Chairman, NATO Advanced Study Institute, International Statistical Ecology Program; College Station, TX
1975-1978	Member, Regional Advisory Board, Biometric Society (ENAR)
1970, 1992	President, Southeast Texas Chapter of American Statistical Association (SETCASA)

SOCIETY MEMBERSHIP:

American Statistical Association
Biometric Society
International Association for Statistical Education
International Statistical Institute
National Council of Teachers of Mathematics

MAJOR RESEARCH INTERESTS:

Biomathematics, Compartmental Analysis, Statistical Ecology, Applied Stochastic Processes, Statistical Education

TEACHING:

Graduate courses: statistical methods, regression analysis, applied stochastic processes, statistical ecology, biomathematical modeling.
Undergraduate courses: statistical methods, linear models, biometry.

PUBLICATIONS:

Books:

1979	*Compartmental Analysis of Ecosystems Models*, Vol. S-10 of Satellite Program in Statistical Ecology. International Co-operative Publishing House; Burtonsville, MD. J. H. Matis, B. C. Patten, and G. C. White, Editors.
2000	*Stochastic Population Models.* Lecture Notes in Statistics 145. Springer; New York. With T. R. Kiffe.

Technical Papers, Theory and Methods:

1967	`Investigation into Precursor-Product Relationships', *Proc. Nat'l. Biomedical Comp. Soc.*. With M. W. Carter.
1971	`Stochastic Compartmental Analysis: Model and Least Squares Estimation from Time Series Data', *Biometrics* 27. With H. O.Hartley.
1972	`Multi-Compartmental Analysis in Steady State as a Stochastic Process', *Acta Biotheoretica* 21. With M. W. Carter.
1972	`Gamma Time-Dependency in Blaxter's Compartmental Model', *Biometrics* 28.
1973	`A Paradox on Compartmental Models with Poisson Immigration' *Am. Stat.* 27.
1974	`On the Probability of Reaching a Threshold in a Stochastic Mammillary System', *Bull. Math. Biology*, 36. With M. Cardenas and R. L. Kodell.
1974	`On the Stochastic Theory of Compartments: Solution for n-Compartment Systems with Irreversible, Time-Dependent Transition Probabilities', *Bull. Math. Biology*, 36. With M. Cardenas.
1975	`On the Time-Dependent Reversible Stochastic Compartmental Model: I. The General Two Compartment Model', *Bull. Math. Biology*, 37. With M. Cardenas.

1975 `On the Time-Dependent Reversible Stochastic Compartmental Model: II. A Class of n-Compartment Systems', *Bull. Math. Biology*, 37. With M. Cardenas.

1976 `Estimating the Rate Constants in a Two-Compartment Stochastic Model', *Biometrics*, 32. With R. L. Kodell.

1976 `A Note on the Use of a Stochastic Mammillary Compartmental Model as an Environmental Safety Model', *Bull. Math. Biology*, 38. With R. L. Kodell and M. Cardenas.

1977 `On the Two-Compartmental Closed Systesm: The Stochastic Non-Steady State Models', *J. Interdisc. Cycle Res.*, 8. With M. D. McKay.

1977 `Small Sample Comparison of Different Estimators of Negative Binomial Parameters', *Biometrics*, 33. With E. Pieters, C. E. Gates, and W. L. Sterling.

1979 `Stochastic Models of Compartmental Systems', *Biometrics, 35.* With T. E. Wehrly.

1979 `Compartmental Models with Multiple Sources of Stochastic Variability: The One-Compartment, Time Invariant Hazard Rate Case', *B. Math. Biology*, 41. With H. D. Tolley.

1979 `On the Distribution of the General Irreversible n-Compartmental Model having Time-Dependent Transition Probabilities', *B. Math. Biology, 41.* With J. O. Epperson.

1979 `An Approach to a Compartmental Model with Multiple Sources of Stochasticity for Modeling Ecological Systems' in *Compartmental Analysis of Ecosystem Models* (J. H. Matis, B. C. Patten and G. C. White, eds.), International Co-operative Publishing House; Burtonsville, MD. With T. E. Wehrly.

1979 `On the Cumulants of Some Stochastic Compartmental Models Applied to Ecological Systems', in *Compartmental Analysis of Ecosystem Models* (J. H. Matis, B. C. Patten, and G. C. White, eds.) International Co-operative Publishing House; Burtonsville, MD. With K.B. Gerald.

1979 `Environ Analysis of Linear Compartmental Systems: The Static Time Invariant Case,' *Proc. 42 Session Int. Statistical Inst.*, Vol. 47, Book 1, Manila, Phillipines. With B. C. Patten.

1980 `On the Stochastic Modeling of Tracer Kinetics', *Federation Proceedings, 39.* With H. D. Tolley.

1981 `On the Relevance of Stochastic Compartmental Models to Pharmacokinetic Systems', *Bull. Math. Biology, 43.* With A. Rescigno.

1981 `Compartmental Models with Multiple Sources of Stochastic Variability: The One-Compartment Models with Clustering', *Bull. Math. Biology, 43.* With T. E. Wehrly.

1981 `Compartmental Modeling and Analysis for Carcinogenic Experiments', *J. Math. Biology, 12.* With R. W. Whitmore.

1982 `The Water Environs of Okefenokee Swamp: An Application of Static Linear Environ Analysis', *Ecol. Modelling, 16.* With B.C. Patten.

1982 `On the Statistical Moments Transformation in Pharmacokinetic Models: A Study of the Rate Parameter and the Mean Residence Time Estimates', *Math. Comp. Simul., 24.* With D. R. Olson and K. B. Gerald.

1983 `The Statistical Analysis of Pharmacokinetic Data,' in *Tracer Kinetic and Physiologic Modeling* (R. M. Lambrecht and A. Rescigno, eds.) Springer-Verlag Lecture Notes in Biomathematics, Vol. 48, New York, N. Y. With T. E. Wehrly and K. B. Gerald.

1983 `On Some Stochastic Formulations and Related Statistical Moments of Pharmacokinetic Models', *J. Pharmacokinetics \& Biopharmaceutics, 11.* With T. E. Wehrly and C. M. Metzler.

1984 `An Irreversible Two-Compartmental Model with Age-Dependent Turnover Rates', *Biometrics, 40.* With T. H. Hughes.

1985 `Stochastic Compartmental Models with Gamma Retention Times: An Application and Estimation Procedure', in *Mathematics and Computers in Biomedical Applications* (J. Eisenfeld and C. DeLisi, eds.) Elsevier, N.Y. With T. E. Wehrly.

1985 `Residence Time Moments of Stochastic Compartmental Models with Age-Dependent and Time-Dependent Rates', in *Mathematics and Computers in Biomedical Applications* (J. Eisenfeld and C. DeLisi, eds.) Elsevier, N.Y. With D. R. Olson.

1985 `On the Use of Residence Time Moments in the Statistical Analysis of Age-Dependent Stochastic Compartmental Models', in *Mathematics in Biology and Medicine* (S. L. Paveri-Fontana and V. Capasso, eds.) Springer-Verlag Lecture Notes in Biomathematics, New York, N.Y. With T. E. Wehrly.

1985 `Modelling Pharmacokinetic Variability on the Molecular Level with Stochastic Compartmental Systems', in *Variability in Drug Therapy* (M. Rowland, L. B. Sheiner and J. L. Steimer, eds.) Raven Press, New York, N.Y. With T. E. Wehrly.

1985 `Use of Residence Time Moments in Compartmental Analysis', *Am. J. Physiol., 249* (Endocrinol. Metab. 12). With T. E. Wehrly and K. B. Gerald.

1985 `A Generalized Approach to Compartmental Modeling Based on Retention Time Distributions', in *Proc. of 2nd Int. Conf. on Rumen Nutrition and Physiology* (R. L. Baldwin and A. C. Bywater, eds.) University of California, Davis.

1986 `On Selecting Optimal Response Variables for Detecting Treatment Effects in a Two-Compartment Model', in *IMACS Trans. Scient. Comp.* 85, Vol. 5 (J. Eisenfeld and W. Witten, eds.) North Holland, Amsterdam, Netherlands. With K. B. Gerald.

1987 `The Case for Stochastic Models of Digesta Flow', *J. Theor. Biol. 124*.

1988 `On Modeling Flow Data Using Generalized Stochastic Compartmental Models', in *Cerebral Blood Flow: Mathematical Models, Instrumentation and Imaging Techniques.* (A. Rescigno, and A. Boicelli, eds.) Plenum, New York. With K. B. Gerald.

1988 `An Introduction to Stochastic Compartmental Models in Pharmacokinetics,' in *Pharmacokinetics: Mathematical and Statistical Approaches to Metabolism and Distribution of Chemicals and Drugs* (A. Pecile and A. Rescigno, eds.) Plenum, New York.

1989 `Some Generalized Stochastic Compartment Models for Digesta Flow,' *Biometrics*, 45. With T. E. Wehrly and W. C. Ellis.

1990 `Generalized Stochastic Compartmental Models with Erlang Transit Times', *J. Pharmacokin. and Biopharm*, 18. With T. E. Wehrly.

1991 `Stochastic Models of Bioaccumulation, in *Metal Ecotoxicology: Concepts and Applications* (M. C. Newman and A. W. McIntosh, eds.) Lewis Publishers, Ann Arbor, MI. With T. H. Miller and D. W. Allen.

1992 `A Semi-Markov Process Model for Migration of Marine Shrimp. *Ecological Modelling*, 60. With W. E. Grant and T. H. Miller.

1992 `Compartmental Models with Erlang Distributed Residence Times and Random Rate Coefficients, *Bull. Math. Biology*, 54. With B. O. Ebaseh-Onofa.

1992 `On the Use of the Gamma Distribution for Predicting Arrival Times of Invading Insect Populations, *Environ. Entomology*, 21. With W. H. Rubink and M. Makela.

1992 `On Using Stochastic Compartmental Models for Describing Insect Dispersal: 1. The Case of Univariate Distributions from Markov Process Models,' in *Biomedical Modeling and Simulation* (J. Eisenfeld, M. Whitten, and D. S. Levine, eds.) Elsevier. With T. E. Wehrly, D. M. Allen, and G.W. Otis.

1992 `Mean Residence Times and Their Standard Errors for Any Interval of Elapsed Time,' in *Biomedical Modeling and Simulation* (J. Eisenfeld, M. Whitten and D. S. Levine, eds.) Elsevier. With D. M. Allen.

1993 `Approximating Multivariate Distributions in Stochastic Models of Insect Population Dynamics' in *Multivariate Environmental Statistics* (G. P. Patil and C. R. Rao, eds.) Elsevier. With T. E. Wehrly and G. W. Otis.

1993 `Some Applications, Properties and Conjectures for Higher Order Cumulants of a Markovian Stepping-Stone Model.' *Comm. Statist.--Theory Method*, 22. With Q. Zheng

1993 `Approximating Discrete Multivariate Distributions from Known Moments.' *Commun. Statist. -- Theory Method* 22. With Q. Zheng

1994 `Compartmental Models of Ecological and Environmental Systems,' in *Environmental Statistics* (G. P. Patil and C.R. Rao, eds.) Elsevier. With T. E. Wehrly

1994 `Use of Birth-Death-Migration Processes for Describing the Spread of Insect Populations.' *Environ. Entomol.* 23. With T. R. Kiffe and G. W. Otis.

1994 `Correlation Coefficient Revisited.' *Am. Stat.* 48. With Q. Zheng.

1995 `Describing the Spread of Biological Populations Using Stochastic Compartmental Models with Births,' *Mathematical Biosciences* 126:215-247. With Q. Zheng and T. R. Kiffe.

1996 `Estimating Parameters for Birth-Death-Migration Models from Spatio-Temporal Abundance Data: Case of Muskrat Spread in the Netherlands. *J. Agricultural, Biological and Environmental Statistics*, 1:40-59. With T. R. Kiffe and R. Hengeveld.

1996 `On Approximating the Moments of the Equilibrium Distribution of a Stochastic Logistic Model.' *Biometrics*, 52:980-991. With T. R. Kiffe.

1996 `Stochastic Compartment Models with Prendville Growth Rates.' *Mathematical Biosciences* 138:31-43. With T. R. Kiffe.

1997 `Using Density-Dependent Birth-Death-Migration Models for Analyzing Muskrat Spread in the Netherlands.' *Jour. Ind. Soc. Ag. Statistics* (Special Golden Jubilee Issue) 49:139--146. With T. R. Kiffe and P. R. Parthasarathy.

1997 `Recent Advances in Modeling Stochastic Population Growth; in *Computer Modeling and Simulations of Complex Biological Systems* (S.S. Iyengar, ed.) CRC Press. With T. R. Kiffe.

1997 `Migration Effects in a Stochastic Multipopulation Model for African Bee Population Dynamics.' *Environmental and Ecological Statistics* 4:301--319. With T. R. Kiffe.

1998 `On the Cumulants of Population Size for the Stochastic Power Law Logistic Model.' *Theoretical Population Biology* 53:16--29. With T. R. Kiffe and P. R. Parthasarathy.

1998 `A General Approach to Non-Markovian Compartmental Models', *J. Pharmacokin. Biopharm.* 26:437--456. With T. E. Wehrly.

1998 `On the Coefficient of Variation for Residence Time Distributions of Some Stochastic Compartmental Models', *Commun. Statist.--Theory Meth.* 27:1757--1780. With J. O. Bader.

1999 `On the Cumulant Functions of Some Logistic Growth Models with Immigration', in: *Stochastic Processes and Their Applications.* (A. Vijayakumar and M. Sreenivasan, eds.) Narosa Publ., London. With T. R. Kiffe.

1999 `Effects of Immigration on Some Stochastic Logistic Models: A Cumulant Truncation Analysis'. *Theoretical Population Biology.* 56:139--161. With T. R. Kiffe.

1999 `On the Numerical Solution of Transient Probabilities of the Stochastic Power Law Logistic Model.' *Nonlinear Analysis* 37:677--688. With P. R. Parthasarathy and R. B. Lenin.

2002 `On Interacting Bee/Mite Populations: A Stochastic Model with Analysis Using Cumulant Truncation.' *Environ. \& Ecol. Statistics* 9:237--258. With T. R. Kiffe.

2002 `On the Use of Time Lags and Time-Dependent Transfers in Compartmental Systems', *Advances in Stochastic Modelling.* (J. R. Artalejo and A. Krishnamoorthy, eds.) Notable Publ., New Jersey. With T. R. Kiffe.

2003 `A Simple Saddlepoint Approximation for the Equilibrium Distribution of the Stochastic Logistic Model of Population Growth.' *Ecological Modelling* 161: 239--248. With T. R. Kiffe, E. Renshaw, and J. Hassan.

2003 `Modeling Processes from Probabilities'; *Mathematical Modeling in Nutrition and the Health Sciences* (J. A. Novotry, M. H. Green, and R. Boston, eds.) p. 87--104. Kluwer Academic, New York. With T. R. Kiffe.

2003 `On the Multiple Birth Effect in Stochastic Host/Parasite Models; With a Moment Closure Analysis of Bee/Mite Interactions,' *Stochastic Point Processes.* (S. K. Srinivasan and A. Vijayakumar, eds.) p. 218--240. Narosa Publishing, New Delhi. With T. R. Kiffe.

2004 `On Stochastic Logistic Population Growth Models with Immigration and Multiple Births.' *Theoretical Population Biology*, 65: 89--104. With T. R. Kiffe.

2005 `Compartment Models,' *Encyclopedia of Biostatistics* 2nd ed., in press. (P. Armitage and T. Colton, eds.) Vol. 2, p. 1021--1025. Wiley, New York. With T. R. Kiffe and T. E. Wehrly.

2005 `Predicting the Africanized Bee Invasion,' *Statistics: A Guide to the Unknown* 4th ed. (R. Peck, et al. ed.) p. 119--134. Duxbury Press. With T. R. Kiffe.

2005 `Nonlinear Stochastic Modeling of Aphid Population Growth,' *Mathematical Biosciences* 198: 148--168. With T. R. Kiffe, T. I. Matis, and D. Stevenson.

2005 `Compartment Models,' *Encyclopedia of Biostatistics* 2nd ed. P. Armitage and T. Colton (eds). Wiley, New York. With T. Kiffe and T. Wehrly.

2006 `Application of Population Growth Models Based on Cumulative Size to Pecan Aphids,' *Journal of Agricultural, Biological, and Environmental Statistics* 11: 425--449. With T. R. Kiffe, T. I. Matis, and D. E. Stevenson.

2007 `Stochastic Modeling of Aphid Population Growth with Nonlinear, Power-Law Dynamics,' *Mathematical Biosciences* 208: 469--494. With T. R. Kiffe, T. I. Matis, and D. E. Stevenson.

2007 `Fitting Cumulative Size Mechanistic Models to Insect Population Data: A Nonlinear Mixed Effects Model Analysis,' *Journal of Indian Society of Agricultural Statistics* 61: 147-155. With L. Zhou, T. R. Kiffe and T. I. Matis.

2007 `Population Size Model Based on Cumulative Size, with Application to Aphids,' *Ecological Modeling* 205: 81--92. With T. R. Kiffe, T. I. Matis, J. A. Jackman and H. Singh.

2008 `On the Use of Growth Rate Parameters for Projecting Population Sizes: Application to Aphids,' *Ecological Modeling* 213: 133--142. With T. R. Kiffe, T. I. Matis, J. A. Jackman, W. E.

Grant and H. Singh.

2008 `A Mechanistic Model Based Analysis of Cotton Aphid Population Dynamics Data,' *Agricultural and Forest Entomology*, 10: 355--362. With T. I. Matis, M. N. Parajulee and R. B. Shrestha.

2008 `Using the Cumulative Size Mechanistic Model for Analyzing Insect Data,' *Proc 2007 Conf Applied Statistics in Agriculture*. With T. I. Matis, G. J. Michels, Jr., and M. N. Parajulee.

2008 `Generalized Applied Population Growth Models with Immigration and Cumulative-Size Dependent Dynamics,' *Math Biosciences*, 215: 137--143. With T. R. Kiffe, T. I. Matis and C. Chattopadhyay.

2008 `Corn Leaf Aphid, *Rhopalosiphum maidis* (Hemiptera: Aphididae), is a Key to Greenbug, *Schizaphis graminum* (Hemiptera: Aphididae), Biological Control in Grain Sorghum, *Sorghum* bicolor.' *European J. Entomology*, 105: 513--520. With G. J. Michels, Jr.

Technical Papers, Applications:

1972 `Orientation of Goldfish in Response to Sublethal Concentration of Copper', *J. Fisheries Res.* 27. With H. Kleerekoper, G. F. Westlake, and P. J. Gensler.

1972 `The Locomotor Response of Goldfish, Channel Catfish, and Large-mouth Bass to a `Copper-Polluted' Mass of Water in an Open Field', *J. Water Resources Res.* 8. With A. M. Timms and H. Kleerekoper.

1972 `Interaction of Temperature and Copper Ions as Orienting Stimuli in the Locomotor Response of the Goldfish', *J. Fisheries Res.*, 30. With H. Kleerekoper and J. Waxman.

1973 `A Time Series Analysis of Some Aspects of Locomotor Behavior of Goldfish, *J. Interdisc. Cycle Research* 4. With H. Kleerekoper and P. J. Gensler.

1973 `Locomotor Response of the Goldfish to Polarized Light and its e-Vector', *J. of Comp. Physiology*, 86. With H. Kleerekoper, A. M. Timms, and P. G. Gensler.

1973 `The Effects of Exposure to Sublethal DDT on the Exploratory Behavior of Goldfish', *J. Water Resources Res.*, 9. With F. B. Davy and H. Kleerekoper.

1974 `Non-random Oscillatory Changes in Orientation of the Goldfish (*Carrassius auratus*) in an Open Field', *An. Behavior*, 22. With H. Kleerekoper and P. G. Gensler.

1974 `Exploratory Behavior of Goldfish (*Carrassius auratus*)', *An. Behavior*, 22. With H. Kleerekoper, P. G. Gensler, and P. Maynard.

1974 `A Stochastic Locomotor Control Model for the Goldfish', *Acta Biotheoretica* 23. With D. R. Childers and H. Kleerekoper.

1974 `The Locomotor Response of Goldfish to a Steep Gradient of Copper Ions', *J. Water Resources Res.*, 10. With G. F. Westlake and H. Kleerekoper.

1974 `On Forecasting the Locomotor Behavior of the Nurse Shark; *Ginglymostoma cirratum*', *J. Interdisc. Cycle Res.*, 5. With H. Kleerekoper and D. Childers.

1975 `Accuracy of Localization of a Chemical Stimulus in Flowing and Stagnant Water by the Nurse Shark, Ginglymostoma cirratum', *J. Comp. Physiol.* 98. With H. Kleerekoper and D. Gruber.

1975 `The Locomotor Behavior of the Nurse Shark, *Ginglymostoma cirratum*: A Time Series Analysis', *Acta Biotheoretica*, 24. With H. Kleerekoper and D. Gruber.

1975 `Interaction of Odor and Flow Perception and the Effects of Parathion in the Locomotor Orientation of the Goldfish', *J. of Fish Biology*, 7. With G. Rand and H. Kleerekoper.

1977 `Long Term Cycles in the Orientation of the Goldfish (*Carassius auratus*) in an Open Field', *J. Interdisc. Cycle Res.*, 8. With H. Kleerekoper and K. Gerald.

1978 `A Stochastic Locomotor Control Model for the Nurse Shark, *Ginglymostoma cirratum*', *J. Math. Biology*, 6. With K. Gerald and H. Kleerekoper.

1979 `Quantitating Ruminal Turnover', *Federation Proceedings, 38*. With W. C. Ellis and C. Lascano.

1979 `Sites Contributing to Compartmental Flow of Forages Residues', *Ann. Rech. Vet, 10*. With W. C. Ellis and C. Lascano.

1984 `Dietary Influences on Flow Rate and Digestive Capacity', in *Herbivore Nutrition in the Subtropics and Tropics* (F. M. C. Gilchrist and R. I. Mackie, eds.) Science Press, Craighall, South Africa. With W. C. Ellis, K. R. Pond, C. E. Lascano, and J. P. Telford.

1984 `Stochastic Compartmental Models of Ecological Succession: Evaluation of their Usefulness to Natural Resource Managers', in *Analysis of Ecological Systems: State-of-the-Art in Ecological Modelling* (W. K. Lauenroth, G. V. Skogerboe, and M. Flug, eds.) Elsevier, N.Y. With W. E. Grant.

1984 `Rumen Microbial Digestion of Fiber as a Stochastic Process', *Canada J. Anim. Sci., 64*, (Sept.

Supl.). With M. Mahlooji, W. C. Ellis, and K. R. Pond.

1984 `The Macrohydrology of Okefenokee Swamp', in *The Okefenokee Swamp: It's Natural History, Geology, and Geochemistry* (A. D. Cohen, O. J. Casagrande, M. J. Andrejko, and G. R. Best, eds.) Wetland Surveys, Los Alamos, NM. With B. G. Patten.

1984 `A Method for Describing the Weight Distribution of Particles from Sieved Forage', in *Techniques in Particle Size Analysis of Feed and Digesta in Ruminants* (P. M. Kennedy, ed.) Canadian Soc. An. Science, Edmonton, Alberta. With K. R. Pond, E. A. Tolley, and W. C. Ellis.

1985 `A Calcite Dissolution Model for the Estimation of Particle Size Distribution', *Soil Sci. Soc. Am. J., 49*. With M. VonTress and R. H. Loeppert.

1985 `A Markov Chain Approach to Crop Yield Forecasting', *Ag. Systems, 18*. With T. Saito, W. E. Grant, W. C. Iwig, and J. T. Ritchie.

1985 `Physical and Chemical Digestion of Forage Fragments with Emphasis on Stochastic, Heterogeneous Rate Model', in *Proc. of 2nd Int. Conf. on Rumen Nutrition and Physiology* (R. L. Baldwin and A. C. Bywater, eds.) University of California, Davis. With W. C. Ellis, K. R. Pond, and M. Mahlooji.

1986 `Markers for Estimating Digesta Flow in Pigs and the Effects of Dietary Fiber', *J. An. Sci.*, 63. With W. G. Pond, K. R. Pond, and W. C. Ellis.

1987 `On the Modeling and Analysis of Digesta Flow Data,' *J. Foreign Livestock* (in Chinese), 41; also in *Proc. 13th Biometric Conf.* With T. E. Wehrly.

1987 `Size Reduction, Fermentation and Passage of Forage Particles and Forage Intake by Cattle,' in *Proc. of Feed Intake by Beef Cattle*, MP Publ. #121, Oklahoma State University, Stillwater. With W. C. Ellis, C. Lascano, M. Mahlooji, and K. R. Pond.

1988 `Dietary-Digestive Interactions Determining the Feeding Value of Forages and Roughages', in *World Animal Science Series*, Vol. B-4, Elsevier, Amsterdam. With W. C. Ellis and M. J. Wylie.

1988 `Compartment Models for Estimating Attributes of Digesta Flow in Cattle,' *Br. J. Nutrition*, 60. With K. R. Pond, W. C. Ellis, H. H. Ferreiro, and J. D. Sutton.

1988 `Forecasting Commercial Harvest of Marine Shrimp Using a Markov Chain Model', *Ecol. Modelling*, 43. With W. E. Grant and W. Miller.

1988 `Flow Characteristics of Various Size Particles and Solutes Through Digestive Segments of Holstein Heifers,' *Br. J. Nutrition*, 60. With M. J. Wylie, W. C. Ellis, and D. E. Beever.

1989 `An Application of the Markov Chain Approach to Forecasting Cotton Yield from Surveys', *Ag. Systems*, 29. With T. Birkett and D. Boudreaux.

1989 `Application of Decision Theory in Understanding Food Choice Behavior of Hatching Loggerhead Sea Turtles and Chemosensory Imprinting in Juvenile Loggerhead Sea Turtles,' *Experientia*, 45. With C. W. Steele, M. A. Grassman, and D. W. Owens.

1989 `Passage of Chromium-Mordanted and Rare Earth-Labelled Fiber: Time of Dosing Kinetics,' *J. Anim. Sci.*, 67. With K. R. Pond, W. C. Ellis, and A. G. Deswysen.

1990 `On a Stochastic Approach to Modeling Ruminant Digestion and Metabolism,' in *Modeling Digestion and Metabolism in Farm Animals* (B. Robson, D. Poppi, J. France and M. Gill, eds.) Lincoln College, New Zealand. With W. C. Ellis and D. M. Allen.

1990 `The Flow of Corn Residues Through the Gastrointestinal Tract of Cattle', *J. Anim. Sc.*, 68. With M. J. Wylie, T. W. White, and W. C. Ellis.

1991 `A Stochastic Compartmental Model for Migration of Marine Shrimp,' *Ecol. Modelling*, 54. With W. E. Grant and T. H. Miller.

1992 `Invasive Dynamics of Africanized Honeybees in North America,' *Naturwissenschaften*, 79. With G. A. Rowell, M. E. Makela, J. D. Villa, J. M. Labougle, and O. R. Taylor.

1992 `Statistical Hammers and Nails for Predicting the Spread of the Africanized Honey Bee,' *Stats.* 7.

1994 `Methodology for Estimating Digestion and Passage Kinetics of Forages', *in Forage Quality, Evaluation and Utilization* (C. G. Fahey, Jr., ed.) Am. Soc. of Agronomy, Inc., Madison, WI. With W. C. Ellis, T. M. Hill, and M. R. Murphy.

1995 `Generalized Stochastic Compartmental Models of Calcium Metabolism', in *Kinetic Models of Trace Element and Mineral Metabolism During Development.* (K. N. S. Subramanian and M. E. Wastney, eds.) CRC Press. With D. M. Allen.

1995 `Predicting the Date of First Catch of the Corn Earworm, *Helicoverpa zea*, in Central U. S.', in *Proc. Conf. Applied Stat. in Agriculture*. Kansas State Univ. With S. Yang, N. Castiaux, J. K.

Westbrook, K. R. Beerwinkle, and J. D. Lopez, Jr.

1997 `Early-Season Migratory Flights of Corn Earworm (*Lepidoptera: Noctuidae*). *Environ. Entomol.* 26:12--20. With J. K. Westbrook, W. W. Wolf, P. D. Lingren, J. R. Raulston, J. D. Lopez, Jr., R. S. Eyster, J. F. Esquivel, and P. G. Schleider.

1999 `Estimating Handling Times for Herbivore Diets: A Statistical Method Using the Gamma Distribution,' *J. Animal Ecology*. 68:638--645. With S. G. Kohlmann and K. L. Risenhoover.

1999 `Dietary-Digestive-Metabolic Interactions Determining the Nutritive Potential of Ruminant Diets', in *Nutritional Ecology of Herbivores*. (H. G. Jung and G. C. Fahey, Jr. eds.) Am. Soc. Animal Science, Savoy, IL. With W. C. Ellis, D. Poppi, H. Lippke, T. M. Hill, and F. M. Rouquette, Jr.

1999 `Temporal Pattern of Ovipositional Readiness in Spring Species of Phyllophaga (Coleoptera: Scarabaeidae) in North Central Texas. *Ann. Entomological Soc. Am.* 92:47--52. With R. L. Crocker, W. T. Nailon, Jr., and R. E. Woodruff.

2000 `The Flow of Forage Particles and Solutes through Segments of the Digestive Tracts of Cattle'. *British J. of Nutrition* 83:295--306. With M. J. Wylie, W. C. Ellis, E. M. Bailey, W. D. James, and D. E. Beever.

2000 `Feed Intake in Ruminants: Kinetic Aspects', in *Farm Animal Metabolism and Nutrition*. (J. P. F. D'Mello ed.) CABI Publishing, New York. With W. C. Ellis and D. Poppi.

2001 `Marker Concentration Patterns of Labelled Leaf and Stem Particles in the Rumen of Cattle Grazing Bermuda Grass (*Cynodon dactylon*) Analyzed by Reference to a Raft Model.' *British J. of Nutrition* 85:553--563. With D. P. Poppi, W. C. Ellis, and C. E. Lascano.

2002 `Validity of Specifically Applied Rate Earth Elements and Compartmental Models for Estimating Flux of Undigested Plant Tissue Residues through the Gastrointestinal Tract of Ruminants.' *J. Animal Science*, 80:2753--2758. With W. C. Ellis and M. J. Wylie.

2003 `Pecan Nut Casebearer Pheromone Monitoring and Degree-Day Model Validation Across the Pecan Belt,' *Integration of Chemical and Biological Insect Control in Native, Seeding, and Improved Pecan Production*. (J. D. Dutcher, M. K. Harris, and D. A. Dean, eds.) With D. E. Stevenson and 16 others.

2004 `Flow Paths of Plant Tissue Residues and Digesta Through Gastrointestinal Segments of Digesta in Spanish Goats and Methodological Considerations.' *J. of Animal Science* 82: 508--520. With L. S. Walz, W. C. Ellis, T. W. White, H. A. Bateman, C. C. Williams, J. M. Fernandez, and L. A. Gentry.

2004 `Integrating Technologically-Based Laboratory Modules into the Stochastic Processes Curriculum,' *Proceedings of Round Table Conference on Curriculum Development in Statistical Education*. International Association of Statistical Education. With T. Matis and L. Riley.

2005 `Feed Quality: Natural Plant Markers-Indigestible Fiber,' *Encyclopedia of Animal Science* (W. G. Pond and A. W. Bell, eds.) Marcel Dekker. With W. C. Ellis and H. Lippke.

2005 `Models for Estimating Parameters of Neutral Detergent Fiber Digestion by Ruminal Microorganisms,' *Journal of Animal Science*, 83: 1591--1601. With W. C. Ellis and M. Mahlooji.

2005 `Effects of Size on Ingestively Masticated Fragments of Plant Tissues on Kinetics of Digestion of NDF,' *Journal of Animal Science*, 83: 1602--1605. With W. C. Ellis, M. Mahlooji, and C. E. Lascano.

2007 `Pharmacokinetics and Safety of Arginine Supplementation in Animals,' *Journal of Nutrition*. With G. Wu, F.W. Bazer, T. A. Cudd, W. S. Jobgen, S. W. Kim, A. Lassala P. Li, C. J. Meininger and T.E. Spencer.

2008 `Corn Leaf Aphid, *Rhopalosiphum maidis* (Hemiptera: Aphididae), is a Key to Greenbug, *Schizaphis graminum* (Hemiptera: Aphididae), Biological Control in Grain Sorghum, *Sorghum* bicolor.' *European J. Entomology*, 105: 513--520. With G. J. Michels, Jr.

2009 'Population Dynamics Models Based on Cumulative Density Dependent Feedback: A Link to the Logistic Growth Curve and a Test for Symmetry Using Aphid Data. *Ecological Modelling*, 220: 1745-1751. With T. R. Kiffe, W. van der Werf, A. C. Costamagna, T. I. Matis and W. E. Grant.

2009 'Comparison of Two Mechanistic Models for Aphid Population Size. Proceedings of the 2008 Conference on Applied Statistics in Agriculture. Kansas State University, Manhattan, Kansas. With T. R. Kiffe, W. van der Werf, G. J. Michels, Jr, and A. Costamagna.

2010 'Using the Logistic pdf Model to Mitigate Autocorrelation in Growth Curve Analysis. *Journal of*

the Indian Society of Agricultural Statistics 64: 229-236. With M. J. Al-Muhammed and W. van der Werf.

2010 'Theory and Application of the Logistic Probability Density Function as a Population Growth Model. *Damascus University Journal for Basic Science* 26: 9-19. With M. J. Al-Muhammed.

2011 'Mitigating Autocorrelation in Richards Growth Model Analysis using Incremental Growth Data, with Application to Turkey Growth. *Journal of the Indian Society of Agricultural Statistics* 65: xxx. With K. T. Mohammed and M. J. Al-Muhammed. (Given Best Paper Award).

2011 'A Population Dynamics Perspective on Effect of Irrigation Regimes and Plant Densities on Greenbug Adundance in Grain Sorghum Using Regression. *Agricultural and Forest Entomology* 12: 15-24. With G. J. Michels, Jr, T. I. Matis and T. R. Kiffe.

Examination of the Appearance of Bias in Judicial Panel Selection
13 October 2014
James H. Matis, PhD

1 Summary

It is my opinion, based on the analysis described in this Report, that Ninth Circuit judge assignments in the Relevant Cases is unlikely to have happened through a neutral selection process. The Relevant Cases are those eleven cases involving the federal constitutional rights of gay men and lesbians and identified in Exhibit 1. Specifically, the probability is very small that Judge Berzon was assigned to five of those cases, that Judge Reinhardt was assigned to four of them, and that at least one of the two served in six of those eleven cases under a neutral selection process. Under the most deferential (or benefit-of-the-doubt) approach, the odds are at least 60-to-1 against a neutral assignment process assigning both judges to the eleventh and now-pending Relevant Case, along with their level of involvement in the first ten of those cases. And under another and potentially more robust analysis, the odds are 441-to-1 against such.

This Report does *not* consider the neutrality or bias of any judge, including any judge in the "group of interest" addressed below. Analysis of personal biases, if any, is beyond the scope of this Report.

2 Introduction

The purpose of this Report is to provide a statistical analysis of whether the selection of the judges on panels in the first ten of the Relevant Cases ("Earlier Cases") and the eleventh of those cases ("Current Case") appears to be biased. By "biased" I mean that there is statistical evidence that the panel of judges was not selected in a neutral fashion to hear those cases.

The data for the portion of this study summarized in Table 2 are the Relevant Cases, the identities and terms of service of the Ninth Circuit's judges serving at any time between January 1, 2010 and September 30, 2014 (as disclosed in publicly available records), and the Ninth Circuit panels assigned to cases in the same city and the same month as each of the Relevant Cases (as disclosed in the Ninth Circuit's publicly available records). The data for the portion of this study summarized in Table 3 are the same, plus the Ninth Circuit panels assigned to cases in the same city and either the preceding month or succeeding month of each

Exhibit 3

of the Relevant Cases (as disclosed in the Ninth Circuit's publicly available records). The data for the portion of this study summarized in Table 4 are all Ninth Circuit panels sitting between January 1, 2009 and September 30, 2014, including the Relevant Cases.

I received Exhibit 1 from Monte Neil Stewart; it is accepted here as representing all the Ninth Circuit cases during the relevant time period (January 1, 2010 through September 8, 2014) that meet the definition of Relevant Case.

The portion of this analysis summarized in Tables 1 and 2 proceeds by first enumerating all panels available to hear each Relevant Case according to the scheduled time and city of the case. Specifically, we construct a list of panels that are scheduled in the same city and the same month as the Relevant Case. I assume that cases are assigned to panels in a neutral fashion. Thus, the probability that a particular Relevant Case is heard by a specific panel is calculated as the reciprocal of the number of available panels. This procedure explicitly adjusts for the difference in the availability of the judges according to their calendar and the scheduled time and city of the hearing. It is my opinion that the rank and file individual would use some approximation of this method as a means of determining whether a particular pattern of membership on the selected panels appeared to be biased.

3 The Model

3.1 Background Assumptions

The basic assumptions for the statistical analysis are the following:

1. The clerk's office constructs three-judge panels from available Ninth Circuit judges. One judge may be selected from outside the Circuit and is a "sitting by designation" judge.

2. Ninth Circuit judges submit a calendar, in advance, indicating their availability.[1]

[1] The statistical procedure given here adjusts for the differential availability of circuit judges with respect to different hearing dates and cities.

3. There is a particular subset of judges that is *a priori* determined to be of interest as regards the determination of bias.[2] We refer to this subset of the judges as the "group of interest."

4. Bias in selection of judges is defined as a disproportionate representation of the judges from the group of interest on the panels which hear the Relevant Cases. "Disproportionate" is measured by calculating the probability distribution of the number of Relevant Cases assigned to panels with one or more members from the group of interest. If the probability of the observed panel assignments (and more extreme assignments) is small, we conclude that the judges in the group of interest are disproportionately represented and hence conclude that the process of selecting panels appears biased.

3.2 Available Panels

I am informed that the mechanism for forming panels is based on each judge's availability. Each judge submits a calendar of available dates in advance of the panel formation process. From this schedule, a set of panels of judges is made up for each possible date of a hearing. Because of the backlog of cases, we assume here that the Ninth Circuit is at full capacity and, consequently, every possible panel for a date is selected. The members of these panels are selected in advance of any case assignments.

I am further informed that hearings of appeals to the Ninth Circuit occur monthly, and there are six different locations for those hearings, with appeals from particular district courts generally assigned to particular cities. A list of locations and the number of Ninth Circuit sittings per year in each location are given in Table 1. I understand that the clerk's office assigns cases to clusters and then a hearing time and place is scheduled. The cluster is then assigned to one of the panels available at the scheduled time and city.

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[2] For example, a subset may consist of those judges that are considered to be highly inclined for or against a sensitive social issue. As noted in the Summary above, this Report does not consider the neutrality or bias of any judge, including any judge in the "group of interest."

Table 1: Locations of Ninth Circuit sittings and the number of courts in each location annually.

Location	Number per year
San Francisco	12
Pasadena	12
Seattle	12
Portland	6
Honolulu	3
Anchorage	1

Once the case cluster is given a date and location, the probability of being assigned to a particular panel available in that month and city is simply the reciprocal of the number of panels so available, assuming such assignment is done randomly. For example, if there were 10 panels for the scheduled time and city, the probability of the case cluster being assigned to any one particular panel would be 1 in 10.

I calculate the probability that a member of the group of interest is on the panel assigned any particular case as the number of panels with a member of the group of interest divided by the total panels available. For example, if Judge Berzon is on two panels for cases heard in July and the total number of panels available for July is 10, then the probability that Judge Berzon would be on the panel to hear a specific case in July is two in ten or 0.2.

Clearly the probability of a selection of a panel in which Judge Berzon is a member will thus depend on the number of panels with Judge Berzon and the total number of panels within the particular month and city of the scheduled hearing. To calculate the probability of being on one or more panels over time thus requires the calculation of the probability for each scheduled instance. For example, consider ten consecutive cases. The probability that Judge Berzon is selected for the first five, and not the second five, is calculated by multiplying the selection probabilities of the first five cases with the probability of non-selection for the final five cases. Note that this is the probability calculation for a specific sequence of assignments.

Now, to calculate the general probability of all possible sequences in which Judge Berzon might be assigned five of ten panels, we take all possible sequences of scheduled hearings with five panels having Judge Berzon and five panels without

Judge Berzon and calculate the probability of each sequence as if that sequence had, in fact, occurred. The total probability is the sum of the probabilities for each sequence, added over all possible sequences. For example, one possible sequence is the one described above, namely, selection for the first five and non-selection for the last five. Another possible sequence would be assignment to panels 1, 2, 3, 4 and 6 and non-assignment to the rest. The product of the probabilities in this sequence will be different according to the availability of the judges. The probabilities for these two possible sequences plus the probabilities of all other sequences with Judge Berzon appearing five times and without Judge Berzon appearing five times gives us the probability of Judge Berzon being assigned to five of ten panels.

4 Results

Here I give the probabilities (and the resulting odds against) for three different subsets of the group of interest. These probabilities are calculated assuming that at least one member of the subset is on the panel for the Current Case. The three subsets of the group of interest are:

1. Contains only Judge Berzon.

2. Contains only Judge Reinhardt.

3. Contains Judge Berzon and Judge Reinhardt. If either one or the other of these two judges or both of these judges is selected, this subset is selected.

Table 2 gives the *a priori* probability of realizing the observed count for the Earlier Cases and assignment to the Current Case for each subset. These calculations assume neutral assignments. Table 2 reports the calculated probabilities and their associated odds against and standard deviations from the mean. These three values measure the likelihood that the observed assignments in the Earlier Cases and the Current Case occurred by neutral or random chance.

Table 2: Probabilities of judge assignments in the Relevant Cases.

Subset	Probability	Odds Against	SD from Mean
Berzon	0.0203	48 to 1	2.05
Reinhardt	0.0173	56 to 1	2.11
Berzon and/or Reinhardt	0.0161	61 to 1	2.14

Because the probabilities are small and the odds against are large, it seems clear that the observed assignments in the Relevant Cases are very unlikely under the assumption of randomness or unbiasedness in the selection of panels.

Note that even though Judge Reinhardt sat on only 4 panels, compared to Judge Berzon, who sat on 5 panels, the odds are larger against Judge Reinhardt because he was not as available as Judge Berzon to sit on panels in the months and cities of the hearings for the Relevant Cases.

5 Comments

5.1 Considering other avenues to introduce bias.

A comment is in order here. The Table 2 calculations are based on a model that gives the greatest benefit of the doubt to the Ninth Circuit's panel-assignment process. That model assumes only one possible avenue to introduce bias, specifically, assigning case clusters to an established set of panels available within the same month in which the Relevant Cases were heard. There are other plausible avenues to introduce bias. For example, the clerk might choose among panels in the immediately adjoining months. If this avenue was available, the calculations are as reflected in Table 3, which reflects a higher appearance of bias.

Table 3: Probabilities of judge assignments in the Relevant Cases (adjoining months)

Subset	Probability	Odds Against	SD from Mean
Berzon	0.0080	124 to 1	2.41
Reinhardt	0.0127	77 to 1	2.24
Berzon and/or Reinhardt	0.0074	134 to 1	2.44

Another plausible avenue to introduce bias is found in General Order 3.2.g., which allows judges in certain situations to exchange panel assignments. I assumed no

effect on bias from this avenue. I did so because of the general commitment of the Ninth Circuit and its judges to the values and benefits of a neutral selection process; in other words, we assumed those judges would not engage in outcome-oriented exchanges.

5.2 Using a re-sampling method.

I also calculated probabilities using a re-sampling method. In this approach, we assume that the process that generates assignments in the Relevant Cases also generates assignments in all other Ninth Circuit cases. This method allows us to compare the assignments in the Relevant Cases with 100,000 randomly chosen groups of eleven Ninth Circuit cases assigned post-2009 to the present. This collection of 100,000 groups acts as a control group. For each group, I looked to see how many assignments were given to each of the two most-assigned judges, without regard to the identity of those judges. (With the Relevant Cases, the numbers are five for Judge Berzon and four for Judge Reinhardt.) The results are set forth in Table 4.

Table 4: Probabilities under a re-sampling method

Most and second-most appearances	Probability	Odds Against	SD from Mean
As extreme or more extreme than observed in Relevant Cases	0.00226	441 to 1	2.84

This re-sampling approach has some important properties. The approaches used with respect to the Relevant Cases required assumptions about judge availability as affected by personal calendars, month, and city. In contrast, the re-sampling approach simply assumes that the assignment process is the same for the Relevant Cases and all other Ninth Circuit cases, whatever that process may be. As such, the results described in Table 4 are more robust to violations of assumptions. Further, as noted earlier, the control group distribution was created without respect to the identity of the two most assigned judges in each group. Because of this feature, the results apply to generic judges rather than to Judge Reinhardt or Judge Berzon specifically and thus finesse *a priori* selection issues.

The re-sampling approach demonstrates a probability of 0.00226 for—that is, odds of 441-to-1 against—what we observe with the Relevant Cases—the two most assigned judges receiving under a neutral assignment process five and four assignments respectively—or anything more extreme.

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Demonstrated expertise in high-stakes trial and appellate work involving constitutional law and federal and state regulatory and administrative regimes.

EDUCATION

2004 M.St. in Legal Research, Oxford University, United Kingdom, *with distinction*

1976 J.D., Brigham Young University, *summa cum laude* and first in class

1973 B.A., Brigham Young University, *summa cum laude* and *Highest Honors*

BAR ADMISSIONS AND RATING

California, 1976 (active status); Nevada, 1981 (active status); Utah, 1998 (active status); Idaho (2009) (active status); various federal district and circuit courts; A.V. rating since 1986

LEGAL EXPERIENCE

2008 – partner, Stewart Taylor & Morris PLLC, Boise, Idaho
- *serving as lead counsel in civil litigation and appellate matters with emphasis on constitutional law and complex disputes*
- *conducted litigation on the constitutionality of man-woman marriage in the federal district courts of Nevada, Utah, and Idaho, in the United States Ninth and Tenth Circuit Courts of Appeals, and in the United States Supreme Court*

2004 – 2008 president, Marriage Law Foundation, Provo, Utah
- *conducted litigation on the constitutionality of man-woman marriage in the trial and appellate courts of nine states and in the United States Eighth Circuit Court of Appeals*

2001 – 2003 counsel to Utah's Governor and special assistant attorney general, Salt Lake City, Utah
- *as lead counsel relative to the placement of high-level nuclear waste, represented the State of Utah in federal district court and before the Unites States Tenth and D.C. Circuit Courts of Appeal*

1999 – 2001 director, Rex E. Lee Advocacy Program, J. Reuben Clark Law School, Brigham Young University, Provo, Utah; special assistant county attorney, *State v. Thomas Arthur Green*, Juab County, Utah

Exhibit 4

- *as director of the Advocacy Program, carried responsibility for the instruction of all first-year law students relative to legal writing and oral advocacy*
- *as a special prosecutor, prosecuted through both bench and jury trials high-profile criminal cases*

1998 – 1999 adjunct professor, J. Reuben Clark Law School, Brigham Young University; of counsel, Fillmore Belliston & Israelsen, Provo, Utah.

- *in of-counsel capacity, served as lead counsel in civil litigation matters for both business entities and individuals*

1992 – 1993 United States Attorney, District of Nevada, Las Vegas, Nevada

- *supervised the work, primarily criminal and civil litigation, of over thirty-five federal attorneys working out of two offices (Las Vegas and Reno)*

1981 – 1992 partner, Wright & Stewart, Las Vegas, Nevada

- *served as lead counsel in civil litigation and appellate matters for business entities and individuals, including numerous bench and jury trials*

1978 – 1981 associate, Gibson, Dunn & Crutcher, San Diego, California

- *focused on business tort claims and complex civil litigation*

1977 – 1978 law clerk, Chief Justice Warren E. Burger, United States Supreme Court, Washington, D.C.

1976 – 1977 law clerk, Judge J. Clifford Wallace, United States Court of Appeals for the Ninth Circuit, San Diego, California

1975 – 1976 editor-in-chief, Brigham Young University Law Review, Provo, Utah

SELECTED PUBLICATIONS

2012 *Marriage, Fundamental Premises, and the California, Connecticut, and Iowa Supreme Courts*, 2012 B.Y.U.L. REV. 193 (with Jacob Briggs and Julie Slater)

2008 *Marriage Facts*, 31 HARV. J.L. & PUB. POL'Y 313 (2008)

2007 *Marriage Facts and Critical Morality*, available at http://marriagelawfoundation.org/mlf/publications/Facts.pdf.

2007 *Dworkin, Marriage, Meanings – and New Jersey*, 4 RUTGERS J. L. & PUB. POL'Y 271 (2007)

2007 *Eliding in Washington and California*, 42 GONZAGA L. REV. 501 (2007)

2006 *Eliding in New York*, 1 DUKE J. CONST. L. & PUB. POL'Y SIDEBAR 37 (2006).

2006 *Genderless Marriage, Institutional Realities, and Judicial Elision,* 1 DUKE J. CONST. L. & PUB. POL'Y 1 (2006).

2005 *Marriage and the Betrayal of* Perez *and* Loving, 2005 B.Y.U. L. REV. 555 (with William C. Duncan).

2004 *Judicial Redefinition of Marriage*, 21 CANADIAN J. FAM. L. 11 (2004)

2004 *Investigating Possible Bias: The American Legal Academy's View of Religiously Affiliated Law Schools,* 54 J. LEGAL EDUC. 136 (2004) (with Prof. Dennis Tolley).

1988 *Compensatory Damages for Fraud in Nevada: A Proposed Approach*, 53 INTER ALIA F7 (1988).

1986 *Pleadings, Amendments to Pleadings and Supplemental Pleadings*, chapter 6, NEVADA CIVIL PRACTICE MANUAL (J. Thompson ed. 1986).

1977 *The* Winters *Doctrine as Federal Common Law*, 10 NAT. RESOURCES J. 457 (1977) (with Robert Grow).

1976 *HEW's Regulation under Title IX of the Education Amendments of 1972: Ultra Vires Challenges*, 1976 B.Y.U.L. REV. 133.