

References

- Anderson, D. R., and K. P. Burnham. 1976. Population ecology of the mallard: VI. The effect of exploitation on survival. U.S. Fish and Wildlife Service Resource Publication 128.
- Anderson, D. R., and K. P. Burnham. 1986. Effect of delayed reporting of band recoveries on survival estimates. *Journal of Field Ornithology* 51:244-247.
- Armitage, P. 1955. Tests for linear trends in proportions and frequencies. *Biometrics* 11:375-386.
- Armitage, P. 1957. Studies in the variability of poek counts. *Journal of Hygiene, Cambridge University Press* 55:564-581.
- Armour, C., K. P. Burnham, and W. S. Platts. 1983. Field methods and statistical analyses for monitoring small salmonid streams. U.S. Fish and Wildlife Service FWS/OBS-83/33.
- Arnason, A. N., and K. H. Mills. 1986. The detection of handling mortality and its effects on Jolly-Seber estimates for mark-recapture experiments. *Canadian Journal of Fisheries and Aquatic Sciences* 44.
- Balser, J. P. 1984. Confidence interval estimation and tests for temporary outmigration in tag-recapture studies. Doctoral dissertation. Cornell University, Ithaca, New York.
- Bartlett, M. S. 1936. Some notes on insecticide tests in the laboratory and in the field. *Journal of the Royal Statistical Society*, 1 of 3, Supplement, 185-194.
- Bartlett, M. S. 1949. Fitting a straight line when both variables are subject to error. *Biometrics* 5:207-212.
- Bellrose, F. C. 1959. Lead poisoning as a mortality factor in waterfowl populations. *Illinois Natural History Survey Bulletin* 27:235-288.
- Berger, J. O., and R. L. Wolpert. 1984. The likelihood principle. Institute of Mathematical Statistics, Monograph Series 6, Hayward, California.
- Berry, K. H., and F. B. Turner. 1986. Spring activities and habits of juvenile desert tortoises, *Gopherus agassizii*, in California. *Copeia* 1986:1010-1012.
- Box, J. F. 1978. R. A. Fisher. The life of a scientist. John Wiley & Sons, New York.
- Brownie, C., D. R. Anderson, K. P. Burnham, and D. S. Robson. 1978. Statistical inference from band recovery data - a handbook. U.S. Fish and Wildlife Service Resource Publication 131.
- Brownie, C., D. R. Anderson, K. P. Burnham, and D. S. Robson. 1985. Statistical inference from band recovery data - a handbook, 2nd edition. U.S. Fish and Wildlife Service Resource Publication 156.

- Brownie, C., J. E. Hines, and J. D. Nichols. 1986. Constant parameter capture-recapture models. *Biometrics* 42:561-574.
- Brownie, C., and K. H. Pollock. 1985. Analysis of multiple capture-recapture data using band-recovery methods. *Biometrics* 41:411-420.
- Brownie, C., and D. S. Robson. 1976. Models allowing for age-dependent survival rates for band-return data. *Biometrics* 32:305-323.
- Brownie, C., and D. S. Robson. 1983. Estimation of time-specific survival rates from tag-resighting samples: a generalization of the Jolly-Seber model. *Biometrics* 39:437-453.
- Buckland, S. T. 1980. A modified analysis of the Jolly-Seber capture-recapture model. *Biometrics* 36:419-435.
- Buckland, S. T. 1984. Monte Carlo confidence intervals. *Biometrics* 40:811-817.
- Buckland, S. T., I. Rowley, and D. A. Williams. 1983. Estimation of survival from repeated sightings of tagged galahs. *Journal of Animal Ecology* 52:563-573.
- Carothers, A. D. 1971. An examination and extension of Leslie's test of equal catchability. *Biometrics* 27:615-630.
- Carothers, A. D. 1973. The effects of unequal catchability on Jolly-Seber estimates. *Biometrics* 29:79-100.
- Clobert, J., J. D. Lebreton, M. Clobert-Gillet, and H. Coquillart. 1985. The estimation of survival in bird populations by recapture or sightings of marked individuals. Pages 197-213 in B. J. T. Morgan and P. North, editors. *Statistics in ornithology*. Springer Verlag, Berlin, West Germany.
- Cochran, W. G. 1954. Some methods for strengthening the common χ^2 tests. *Biometrics* 10:417-451.
- Cochran, W. G. 1963. *Sampling techniques*, 2nd edition. John Wiley & Sons, New York.
- Conroy, M. J., and B. K. Williams. 1984. Sensitivity of band reporting-rate estimates to violation of assumptions. *The Journal of Wildlife Management* 45:789-792.
- Cormack, R. M. 1964. Estimates of survival from the sighting of marked animals. *Biometrika* 51:429-438.
- Cormack, R. M. 1968. The statistics of capture-recapture methods. *Oceanography and Marine Biology: an Annual Review* 6:455-506.
- Cormack, R. M. 1972. The logic of capture-recapture estimates. *Biometrics* 28:337-343.
- Cormack, R. M. 1973. Common sense estimates from capture-recapture studies. Pages 225-234 in M. S. Bartlett and R. W. Hiorns, editors. *The mathematical theory of the dynamics of biological populations*. Academic Press, London.
- Cormack, R. M. 1979. Models for capture-recapture. Pages 217-255 in R. M. Cormack, G. P. Patil, and D. S. Robson, editors. *Statistical ecology, volume 5. Sampling biological populations*. International Co-operative Publishing House, Fairland, Maryland.
- Cormack, R. M. 1981. Loglinear models for capture-recapture experiments on open populations. Pages 217-235 in R. W. Hiorns and D. Cooke, editors. *The mathematical theory of the dynamics of biological populations*. Academic Press, London.
- Cox, D. R. 1958. *Planning of experiments*. John Wiley & Sons, New York.

- Cox, D. R. 1961. Tests of separate families of hypotheses. *Proceedings Fourth Berkeley Symposium*:105-123.
- Cox, D. R. 1970. *The analysis of binary data*. Methuen, London.
- Cox, D. R. 1983. Some remarks on overdispersion. *Biometrika* 70:269-274.
- Cramer, F. K., and R. C. Olliger. 1964. Passing fish through hydraulic turbines. *Transactions of the American Fisheries Society* 93:243-250.
- Crosbie, S. F., and B. F. J. Manly. 1985. A new approach for parsimonious modeling of capture-mark-recapture studies. *Biometrics* 41:385-398.
- David, H. A., and M. L. Moeschberger. 1978. *The theory of competing risks*. Macmillan, New York.
- Davidson, R. R., and D. L. Solomon. 1974. Moment-type estimation in the exponential family. *Communications in Statistics* 3:1101-1108.
- Deuel, B. 1985. Experimental lead dosing of northern pintails in California. *California Fish and Game* 71:125-128.
- Dixon, W. J. 1983. *BMDP statistical software*. University of California Press, Los Angeles.
- Draper, N. R., and H. Smith. 1981. *Applied regression analysis*. John Wiley & Sons, New York.
- Edwards, A. W. F. 1972. *Likelihood*. Cambridge University Press, London.
- Finney, D. J. 1971. *Probit analysis*, 3rd edition. Cambridge University Press, Cambridge, England.
- Fisher, R. A. 1922. On the mathematical foundation of theoretical statistics. *Philosophical Transactions of the Royal Society of London, Series A: Mathematical and Physical Sciences* 222:309-368.
- Fisher, R. A. 1925. Theory of statistical estimation. *Proceedings of the Cambridge Philosophical Society* 22:700-725.
- Fisher, R. A. 1949. A biological assay of tuberculins. *Biometrics* 5:300-316.
- Fisher, R. A. 1956. *Statistical methods and scientific inference*. Hafner, New York.
- Fisher, R. A. 1958. *Statistical methods for research workers*, 12th edition. Hafner, New York.
- Fleiss, J. L. 1981. *Statistical methods for rates proportions*, 2nd edition. John Wiley & Sons, New York.
- Fletcher, R. I. 1985. Risk analysis for fish diversion experiments: pumped intake systems. *Transactions of the American Fisheries Society* 114:652-694.
- Gart, J. J. 1985. Approximate tests and interval estimation of the common relative risk in the combination of 2 x 2 tables. *Biometrika* 72(3):673-677.
- Green, P. J. 1984. Iteratively reweighted least squares for maximum likelihood estimation, and some robust and resistant alternatives. *Journal of the Royal Statistical Society, Series B* 46:149-192.
- Green, R. H. 1979. *Sampling design and statistical methods for environmental biologists*. John Wiley & Sons, New York.
- Grizzle, J. E., C. F. Starmer, and G. G. Koch. 1969. Analysis of categorical data by linear models. *Biometrics* 25:489-504.
- Hacking, I. 1965. *Logic of statistical inference*. Cambridge University Press, London.

- Hadley, G. 1964. Nonlinear and dynamic programming. Addison-Wesley, Reading, Massachusetts.
- Hammersley, J. M. 1953. Capture-recapture analysis. *Biometrika* 40:265-278.
- Healy, M. J. R. 1981. A source of assay heterogeneity. *Biometrics* 37:834-835.
- Hightower, J., and R. J. Gilbert. 1984. Using the Jolly-Seber model to estimate population size, mortality, and recruitment for a reservoir fish population. *Transactions of the American Fisheries Society* 113:633-641.
- Hogg, R. V., and A. T. Craig. 1970. Introduction to mathematical statistics, 3rd edition. Macmillan, New York.
- Huber, P. J. 1967. The behavior of maximum likelihood estimates under nonstandard conditions. *Proceedings Fifth Berkeley Symposium*:221-233.
- Hurlbert, S. H. 1984. Pseudoreplication and the design of ecological field experiments. *Ecological Monographs* 54:187-211.
- Huzurbazar, V. S. 1976. Sufficient statistics: selected contributions. Marcel Dekker, New York.
- Jennrich, R. I., and R. H. Moore. 1975. Maximum likelihood estimation by means of nonlinear least squares. Pages 57-65 in *Proceedings of the statistical computing section, American Statistical Association, Washington, D.C.*
- Johnson, N. L., and S. Kotz. 1972. Distributions in statistics: continuous multivariate distributions. John Wiley & Sons, New York.
- Johnston, J. 1972. Econometric methods, 2nd edition. McGraw-Hill, New York.
- Jolly, G. M. 1965. Explicit estimates from capture-recapture data with both death and immigration-stochastic models. *Biometrika* 52:225-247.
- Kalbfleisch, J. D., and R. L. Prentice. 1980. The statistical analysis of failure time data. John Wiley & Sons, New York.
- Kale, B. K. 1962. On the solution of likelihood equations by iteration processes: the multiparametric case. *Biometrika* 49:479-486.
- Kempthorne, O., and L. Folks. 1971. Probability, statistics, and data analysis. Iowa State University Press, Ames.
- Kendall, M. G., and A. Stuart. 1967. The advanced theory of statistics. Hafner, New York.
- Kent, J. T. 1982. Robust properties of likelihood ratio tests. *Biometrika* 69:19-27.
- Lefebvre, L. W., D. L. Otis, and N. R. Holler. 1982. Comparison of open and closed models for cotton rat population estimates. *Journal of Wildlife Management* 56:156-163.
- Lehmann, E. L. 1959. Testing statistical hypotheses. John Wiley & Sons, New York.
- Lehmann, E. L. 1983. Theory of point estimation. John Wiley & Sons, New York.
- Mangasarian, O. L. 1969. Nonlinear programming. McGraw-Hill, New York.
- Manly, B. F. J. 1970. A simulation study of animal population estimation using the capture-recapture method. *Journal of Applied Ecology* 7:13-39.
- Manly, B. F. J. 1971a. A simulation study of Jolly's method for analyzing capture-recapture data. *Biometrics* 27:415-424.
- Manly, B. F. J. 1971b. Estimation of marking effect with capture-recapture sampling. *Journal of Applied Ecology* 8:181-189.

- Manly, B. F. J. 1977. A note on the design of experiments to estimate survival and relative survival. *Biometrical Journal* 19:687-692.
- Manly, B. F. J. 1981. Estimation of absolute and relative survival rates from the recoveries of dead animals. *New Zealand Journal of Ecology* 4:78-88.
- Manly, B. F. J. 1984. Obtaining confidence limits on parameters of the Jolly-Seber model for capture-recapture data. *Biometrics* 40:749-758.
- Manly, B. F. J. 1985. The statistics of natural selection on animal populations. Chapman and Hall, New York.
- McCullagh, P., and J. A. Nelder. 1983. Generalized linear models. Chapman and Hall, London.
- McCullagh, P., and D. Pregibon. 1985. Discussion comments on the paper by Diaconis and Efron. *The Annals of Statistics* 13:898-900.
- Mood, A. M., and F. A. Graybill. 1963. Introduction to the theory of statistics, 2nd edition. McGraw-Hill, New York.
- Mood, A. M., F. A. Graybill, and D. C. Boes. 1974. Introduction to the theory of statistics, 3rd edition. McGraw-Hill, New York.
- Moore, D. S. 1984. Measures of lack of fit from tests of the chi-squared type. *Journal of Statistical Planning and Inference* 10:151-166.
- Nelson, L. J., D. R. Anderson, and K. P. Burnham. 1980. The effect of band loss on estimates of annual survivals. *Journal of Field Ornithology* 51:30-38.
- Neter, J., and W. Wasserman. 1974. Applied linear statistical models. Richard D. Irwin, Homewood, Illinois.
- Nichols, J. D., J. E. Hines, and K. H. Pollock. 1984. Effects of permanent trap response in capture probability on Jolly-Seber capture-recapture model estimates. *The Journal of Wildlife Management* 48:289-294.
- Nichols, J. D., B. R. Noon, S. L. Stokes, and J. E. Hines. 1981. Remarks on the use of mark-recapture methodology in estimating avian population size. *Studies in Avian Biology* 6:121-136.
- Nichols, J. D., S. L. Stokes, J. E. Hines, and M. J. Conroy. 1982. Additional comments on the assumptions of homogeneous survival rates in modern bird banding estimation models. *The Journal of Wildlife Management* 46:953-962.
- North, P. M., and B. J. T. Morgan. 1979. Modelling heron survival using weather data. *Biometrics* 35:667-681.
- Olson, F. W., R. G. White, and R. H. Hamre, editors. 1985. Symposium on small hydropower and fisheries. American Fisheries Society, Bethesda, Maryland.
- Ostle, B. 1963. Statistics in research. Iowa State University Press, Ames.
- Otis, D. L., K. P. Burnham, G. C. White, and D. R. Anderson. 1978. Statistical inference from capture data on closed animal populations. *Wildlife Monograph* 62.
- Owen, D. B. 1962. Handbook of statistical tables. Addison-Wesley, Reading, Massachusetts.
- Pollock, K. H. 1975. A K -sample tag-recapture model allowing for unequal survival and catchability. *Biometrika* 62:577-583.
- Pollock, K. H. 1981a. Capture-recapture models allowing for age-dependent survival and capture rates. *Biometrics* 37:521-529.

- Pollock, K. H. 1981b. Capture-recapture models: a review of current methods, assumptions, and experimental design. *Studies in Avian Biology* 6:426-435.
- Pollock, K. H. 1982. A capture-recapture design robust to unequal probability of capture. *The Journal of Wildlife Management* 46:752-757.
- Pollock, K. H., J. E. Hines, and J. D. Nichols. 1985. Goodness-of-fit tests for open capture-recapture models. *Biometrics* 41:399-410.
- Pollock, K. H., and R. H. K. Mann. 1983. Use of an age-dependent mark-recapture model in fisheries research. *Canadian Journal of Fisheries and Aquatic Sciences* 40:1449-1455.
- Pollock, K. H., J. D. Nichols, C. Brownie, and J. E. Hines. (In prep.) Statistical inference for capture-recapture experiments.
- Pollock, K. H., and D. G. Raveling. 1982. Assumptions of modern band-recovery models, with emphasis on heterogeneous survival rates. *The Journal of Wildlife Management* 46:88-98.
- Popper, K. R. 1959. *The logic of scientific discovery*. Basic Books, Hutchinson, London.
- Rao, C. R. 1973. *Linear statistical inference and its applications*. John Wiley & Sons, New York.
- Ricker, W. E. 1945. Abundance, exploitation, and mortality of the fishes of two lakes. *Investigations of Indiana Lakes and Streams* 2:345-448.
- Ricker, W. E. 1948. Methods of estimating vital statistics of fish populations. *Indiana University Publications in Science Series* 15.
- Ricker, W. E. 1958. Handbook of computations of biological statistics of fish populations. *Fisheries Research Board of Canada Bulletin* 119.
- Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. *Fisheries Research Board of Canada Bulletin* 191.
- Robson, D. S. 1969. Mark-recapture methods of population estimation. Pages 120-140 in N. L. Johnson and H. Smith, Jr., editors. *New developments in survey sampling*. Wiley Interscience, New York.
- Royall, R. M. 1986. Model robust confidence intervals using maximum likelihood estimators. *International Statistical Review* 54:221-226.
- Sandland, R. L., and P. Kirkwood. 1981. Estimation of survival in marked populations with possibly dependent sighting probabilities. *Biometrika* 68:531-541.
- Savage, L. J. 1962. *The foundations of statistical inference*. Methuen, London.
- Schoenemon, D. E., R. Pressely, and C. O. Junge, Jr. 1961. Mortality of downstream migrant salmon at McNary Dam. *Transactions of the American Fisheries Society* 90:58-72.
- Seber, G. A. F. 1962. The multi-sample single recapture census. *Biometrika* 49:339-350.
- Seber, G. A. F. 1965. A note on the multiple-recapture census. *Biometrika* 52:249-259.
- Seber, G. A. F. 1970. Estimating time-specific survival and reporting rates for adult birds from band returns. *Biometrika* 57:313-318.
- Seber, G. A. F. 1982. *The estimation of animal abundance and related parameters*, 2nd edition. Macmillan, New York.
- Seber, G. A. F. 1986. A review of estimating animal abundance. *Biometrics* 42:267-292.

- Semple, J. R. 1979. Downstream facilities and turbine mortality evaluation, Atlantic salmon smolts at Malay Falls, Nova Scotia. Canadian Fisheries and Marine Service Manuscript Report 1541.
- Skalski, J. R. 1985. Construction of cost functions for tag-recapture research. *Wildlife Society Bulletin* 13:273-283.
- Snedecor, G. W., and W. G. Cochran. 1980. *Statistical methods*. Iowa State University Press, Ames.
- Sprott, D. A. 1982. Robustness and maximum likelihood estimation. *Communications in Statistics-Theory and Methods* 11:2513-2529.
- Steel, R. G. D., and J. H. Torrie. 1980. *Principles and procedures of statistics: a biometrical approach*, 2nd edition. McGraw-Hill, New York.
- Stewart-Oaten, A., W. W. Murdoch, and K. R. Parker. 1986. Environmental impact assessment: "pseudoreplication" in time? *Ecology* 67:929-940.
- Stier, D. J., and B. Kynard. 1986. Use of radio telemetry to determine the mortality of Atlantic salmon smolts passed through a 17-MW Kaplan Turbine at a low-head hydroelectric dam. *Transactions of the American Fisheries Society* 115:771-775.
- Stokes, S. L. 1984. The Jolly-Seber method applied to age-stratified populations. *The Journal of Wildlife Management* 48:1053-1059. (Corrigendum: 1985. *The Journal of Wildlife Management* 49:282.)
- Stromborg, K. L., C. E. Grue, J. D. Nichols, G. R. Hepp, J. E. Hines, and H. C. Borne. In press. Postfledging survival of nestling European starlings exposed to an organophosphate insecticide: a field experiment. *Ecology*.
- Vaupel, J. W., and A. I. Yashin. 1985. Heterogeneity's ruses: some surprising effects of selection on population dynamics. *American Statistician* 39:176-185.
- Wald, A. 1940. The fitting of straight lines if both variables are subject to error. *Annals of Mathematical Statistics* 11:284-300.
- White, G. C. 1983. Numerical estimation of survival rates from band-recovery and biotelemetry data. *The Journal of Wildlife Management* 47:716-728.
- White, G. C., D. R. Anderson, K. P. Burnham, and D. L. Otis. 1982. Capture-recapture and removal methods for sampling closed populations. Los Alamos National Laboratory, LA-8787-NERP, Los Alamos, New Mexico.
- Wilks, S. S. 1962. *Mathematical statistics*. John Wiley & Sons, New York.
- Williams, D. A. 1982. Extra-binomial variation in logistic linear models. *Applied Statistics* 31:144-148.
- Wonnacott, R. J., and T. H. Wonnacott. 1970. *Econometrics*. John Wiley & Sons, New York.
- Youngs, W. D., and D. S. Robson. 1975. Estimating survival rate from tag returns: model tests and sample size determination. *Journal of the Fisheries Research Board of Canada* 32:2365-2371.

Unpublished Reports

- Anonymous. 1980.** An evaluation of the effectiveness of water spilling for passage of juvenile salmon at Wanapum Dam. Report to Public Utility Districts of Grant, Douglas, and Chelan counties, Washington.
- Burnham, K. P. 1987.** A unified approach to animal release-resampling studies of survival processes and population estimation. North Carolina State University, Institute of Statistics, Mimeograph Series 1698, Raleigh.
- Heinle, D. H., and F. W. Olson. 1981.** Survival of juvenile coho salmon passing through the spillway at Rocky Reach Dam. Chelan County (Washington) Public Utility District, Report S13752.AO.
- Long, C. W., F. J. Ossiander, T. E. Ruehle, and G. M. Matthews. 1975.** Survival of coho salmon fingerlings passing through operating turbines with and without perforated bulkheads and of steelhead trout fingerlings passing through spillways with and without a flow deflector. Final report to U.S. Army Corps of Engineers from Northwest Fisheries Center, National Marine Fisheries Service, Seattle, Washington.
- McKenzie, D., D. Carlile, and D. Weitkamp. 1984.** 1983 Systems mortality study. Report to Public Utility Districts of Grant, Douglas, and Chelan counties, Washington.
- McKenzie, D., D. Weitkamp, T. Schadt, D. Carlile, and D. Chapman. 1984.** 1982 Systems mortality study. Report to Public Utility Districts of Grant, Douglas, and Chelan counties, Washington.
- Olson, F. W. 1982.** Rock Island Dam fingerling bypass evaluation. Chelan County (Washington) Public Utility District, Report S14734.AO.
- Olson, F. W. 1983.** Rock Island Dam fish bypass study. Chelan County (Washington) Public Utility District, Report S15931.AO.
- Olson, F. W., and V. W. Kaczynski. 1980.** Survival of downstream migrant coho salmon and steelhead trout through bulb turbines. Chelan County (Washington) Public Utility District, Report S12509.
- Prentice, E. F., and D. L. Park. 1984.** A study to determine the biological feasibility of a new fish tagging system. Annual report of research, Bonneville Power Administration, U.S. Department of Energy, Portland, Oregon and Coastal Zone and Estuarine Studies Division, Northwest and Alaska Fisheries Center, National Marine Fisheries Service, Seattle, Washington.
- Prentice, E. F., C. W. Sims, and D. L. Park. 1985.** A study to determine the biological feasibility of a new fish tagging system. Annual report of research, Bonneville Power Administration, U.S. Department of Energy, Portland, Oregon and Coastal Zone and Estuarine Studies Division, Northwest and Alaska Fisheries Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Seattle, Washington.

- Robson, D. S., and W. D. Youngs. 1971.** Statistical analysis of reported tag-recaptures in the harvest from an exploited population. Cornell University Biometrics Unit, BU-369-M, Ithaca, New York.
- Turbak, S. C., D. R. Reichle, and C. R. Shriner. 1981.** Analysis of environmental issues related to small scale hydroelectric development: fish mortality resulting from turbine passage. Oak Ridge National Laboratories, Environmental Science Division, Publication 1597, Oak Ridge, Tennessee.
- Turner, F. B., and K. H. Berry. 1986.** Population ecology of the desert tortoise at Goffs, California, in 1985. University of California Laboratory of Biomedical and Environmental Sciences, Report 12-1544, Los Angeles.