



## Trent L. McDonald, *Senior Biometrician/Senior Manager*

### PROFESSIONAL EXPERIENCE

- 1995-Present *Consulting Biometrician/Senior Manager*, Western EcoSystems Technology, Inc., Laramie, Wyoming
- 2001-Present *Adjunct Professor of Statistics*, University of Wyoming, Laramie, Wyoming
- 1992-1995 *Graduate Research Assistant*, Oregon State University, Corvallis, Oregon
- 1991-1992 *Fisheries Biologist II*, University of Washington School of Fisheries
- 1990-1991 *Statistician*, Statistics and Epidemiology Research Corporation
- 1988-1990 *Graduate Research Assistant*, New Mexico State University, Las Cruces, New Mexico

### SPECIALTY AREAS

Dr. McDonald specializes in application of capture-recapture analyses, habitat selection analysis, line transect analysis, linear models, computer intensive statistical models, and finite population surveys. In applications, he has experience detecting bowhead whale deflection around an anthropogenic sound source, modeling population growth and demographic parameters of Northern spotted owls and polar bears, analyzing aerial surveys for Eastern grey whales, modeling habitat needs of moose, grizzly bears, polar bears, and bighorn sheep. Dr. McDonald has published a number of articles on capture-recapture and habitat selection methods, including co-editing a book on capture-recapture methods and co-authored a book on habitat-selection. Computer intensive statistical methods, such as bootstrap and permutation methods, as well as their application to dependent data, are a key component of all of Dr. McDonald's work. Workshop instruction experience includes workshops on computer intensive statistics, resource selection, and capture-recapture. He has worked for private and public clients including the National Park Service, U.S. Geological Survey, U.S. Fish and Wildlife Service, BP, Exxon, Green Diamond Resource, and others. His endangered species experience includes projects on Northern spotted owls, bowhead whales, eastern grey whales, polar bears, grizzly bears, tailed frogs, hell-benders, and many others.

### PEER REVIEWED PUBLICATIONS

- Holst, M., C.R. Greene, Jr., W.J. Richardson, **T.L. McDonald**, K. Bay, S.J. Schwartz, and G. Smith (in Press) "Responses of Pinnipeds to Navy Missile Launches at San Nicolas Island, California" *Aquatic Mammals*.
- McDonald, T. L.**, W. J. Richardson, C. R. Greene, S. B. Blackwell, C. Nations, R. Nielson, and B. Streever (in Press) "Detecting Changes in Distribution of Calling Bowhead Whales Exposed to Fluctuating Anthropogenic Sounds". *Journal of Cetacean Research and Management*.
- Blackwell, S. B., **T.L. McDonald**, K.H. Kim, L.A.M. Aerts, W.J. Richardson, C.R. Greene Jr., and B. Streever (in Press) "Directionality of Bowhead Whale Calls Measured with Multiple Sensors", *Marine Mammal Science*.
- Stirling, I., **T. L. McDonald**, E. S. Richardson, E.V. Regehr, and Steven C. Amstrup, (In Press) "Polar bear population status in the northern Beaufort Sea, Northwest Territories, Canada, in relation to sea ice and aboriginal harvesting, 1971 - 2006" *Ecological Applications*.
- Blakesly, J. A., Seamans, M. E., Conner, M. M., Franklin, A. B., White, G. C., Gutierrez, R. J., Hines, J. E., Nichols, J. D., Munton, T. E., Shaw, D. W., Keane, J. J., Steger, G. N., and **McDonald, T. L.** (2010) "Population dynamics of spotted owls in the Sierra Nevada, California", *Wildlife Monographs*, v174, p. 1-36.
- McDonald, T. L.**, and G. C. White (2010) "A comparison of regression models for small counts". *Journal of Wildlife Management*, v74(4), p. 514-521.
- Nielson, R. M., B. F. J. Manly, L. L. McDonald, H. Sawyer, and **T. L. McDonald** (2009) "Estimating habitat selection when GPS fix success is less than 100%". *Ecology*. v90(10), p. 2956-2962.
- Liebezeit, J. R., S. J. Kendall, S. Brown, C. B. Johnson, P. Martin, **T. L. McDonald**, D. C. Payer, C. L. Rea, B. Streever, A. M. Wildman, and S. Zack (2009) "Influence of human development and predators on nest survival of tundra birds, Arctic Coastal Plain Alaska", *Ecological Applications*, v19(6), p. 1628-1644.

### EDUCATION

- Ph.D.  
Oregon State University  
Corvallis, Oregon  
1996  
Statistics
- M.S.  
New Mexico State University  
Las Cruces, New Mexico  
1992  
Experimental Statistics
- B.S.  
University of Wyoming  
Laramie, Wyoming  
1989-With Honor  
Statistics/Computer Science



- Koski, W. R., T. Allen, D. Ireland, G. Buck, P. R. Smith, A. M. Macrander, M. A. Halick, C. Rushing, D. J. Sliwa, and **T. L. McDonald**. (2009) "Evaluation of an unmanned airborne system for monitoring marine mammals", *Aquatic Mammals*, v35(3), p. 348-358.
- Durner, G. M., D. Douglas, R. Nielson, S. C. Amstrup, **T. L. McDonald**, I. Stirling, M. Mauritzen, E. Born, O. Wiig, E. DeWeaver, M. Serreze, S. Belikov, M. Holland, J. Maslanik, J. Aars, D. Bailey, and A. Derocher., (2009) "Predicting 21st Century Polar Bear Habitat Distribution from Global Climate Models" *Ecological Monographs*, v79, p. 25-58.
- Streever, B., R. P. Angliss, R. Suydam, M. Ahmaogak, C. Bailey, S. B. Blackwell, J. C. George, C. R. Greene, Jr., R. S. Jakubczak, J. Lefevre, **T. L. McDonald**, T. Napageak, and W. J. Richardson, (2008) "Progress Through Collaboration: A Case Study Examining Effects of Industrial Sounds on Bowhead Whales", *Bioacoustics* v17, p. 345-347.
- Goodrich, J. M., L. L. Kerley, E. N. Smirnov, D. G. Miquelle, L. McDonald, H. B. Quigley, M. G. Hornocker, and **T. L. McDonald** (2008) "Survival rates and causes of mortality of Amur tigers on and near the Sikhote-Alin Biosphere Zapovednik". *Journal of Zoology*, p. 1-7.
- Hamer, T., D. E. Varland, **T. L. McDonald**, and D. Meekins (2008) "Predictive model of habitat suitability for the marbled murrelet in western Washington" *Journal of Wildlife Management* v72, p. 983-993.
- Yazvenko, S. B., **T. L. McDonald**, S. A. Blokhin, S. R. Johnson, S. K. Meier, H. R. Melton, M. W. Newcomer, R. Nielson, V. L. Vladimirov, and P. W. Wainwright (2007) "Distribution and abundance of western gray whales during seismic survey near Sakhalin Island, Russia" *Environmental Monitoring and Assessment* v134, p. 45-73.
- Yazvenko, S. B., **T. L. McDonald**, S. A. Blokhin, S. R. Johnson, H. R. Melton, M. W. Newcomer, R. Nielson, and P. W. Wainwright (2007) "Feeding of western gray whales during a seismic survey near Sakhalin Island, Russia", *Environmental Monitoring and Assessment* v134, p. 93-106.
- Gailey, G., B. Würsig, and **T. L. McDonald** (2007) "Abundance, behavior, and movement patterns of western gray whales in relation to a 3-D seismic survey, Northeast Sakhalin Island, Russia", *Environmental Monitoring and Assessment*, v134, p. 75-91.
- Smith, B.L., E.S. Williams, K.C. McFarland, **T.L. McDonald**, G. Wang, and T.D. Moore. (2006) "Neonatal mortality of elk in Wyoming: environmental, population, and predator effects". U.S. Department of Interior, U.S. Fish and Wildlife Service, Biological Technical Publication, BTP-R6007-2006, Washington, D.C.
- McDonald, T. L.**, B. F. J. Manly, R. M. Nielson, and L. V. Diller (2006) "Discrete-choice modeling in wildlife studies exemplified by Northern spotted owl nighttime habitat selection", *Journal of Wildlife Management* v70, p. 375-383. [INVITED PAPER]
- Johnson, C. J., S. E. Nielsen, E. H. Merrill, **T. L. McDonald**, and M. S. Boyce (2006) "Resource selection functions based on use-availability data: theoretical motivation and evaluation methods", *Journal of Wildlife Management* v70, p. 347-357. [INVITED PAPER]
- Haskell, S. P, R. M. Nielson, W. B. Ballard, M. A. Cronin, and **T. L. McDonald** (2006) "Dynamic responses of calving caribou to oilfields in northern Alaska", *Arctic* v59, p. 179-190.
- Amstrup, S. C., **T. L. McDonald**, and B. F. J. Manly, Editors, (2006) *Handbook of Capture-Recapture Analysis*. Princeton NJ: Princeton University Press. [Recipient of 2007 WILDLIFE PUBLICATIONS AWARD – OUTSTANDING EDITED BOOK, THE WILDLIFE SOCIETY]
- Hebblewhite, M., E. H. Merrill, and **T. L. McDonald** (2005) "Spatial decomposition of predation risk using resource selection functions: an example in a wolf-elk predator-prey system", *OIKOS* v111, p. 101-111.
- Goldstein, M. I., A. J. Poe, E. Cooper, D. Youkey, B. A. Brown, and **T. L. McDonald**. (2005) "Mountain goat response to helicopter overflights in Alaska." *Wildlife Society Bulletin* v33, p. 688-699.
- Amstrup, S. C., G. M. Durner, I. Stirling, and **T. L. McDonald** (2005) "Allocating harvests among polar bear stocks in the Beaufort Sea", *Arctic* v58, p. 247-259.
- Moulton, V. D., W. J. Richardson, R. E. Elliott, **T. L. McDonald**, C. Nations, and M. T. Williams (2005) "Effects of an offshore oil development on local abundance and distribution of ringed seals (*Phoca hispida*) of the Alaskan Beaufort Sea." *Marine Mammal Science* v21, p. 217-242.
- Lee, S. H., D. M. Schell, **T. L. McDonald**, and W. J. Richardson (2005) "Regional and seasonal feeding by bowhead whales *Balaena mysticetus* as indicated by stable isotope ratios", *Marine Ecology Progress Series*, v285, p. 271-287.
- Goodrich, J. M., L. L. Kerley, E. N. Smirnov, D. G. Miquelle, B. O. Schleyer, L. McDonald, and **T. L. McDonald** (2005) "Survivorship and causes of mortality in Amur tigers of the Sikhote-Alin Biosphere Zapovednik and adjacent territories". Pages 69-75 in D. G. Miquelle, E. N. Smirnov, and



- J. M. Goodrich, editors. *Tigers of Sikhote-Alin Zapovednik: ecology and conservation*. PSP, Vladivostok, Russia. 224 pp. (in Russian)
- Amstrup, S. C., **T. L. McDonald**, and G. M. Durner (2004) "Using satellite radiotelemetry data to delineate and manage wildlife populations", *Wildlife Society Bulletin*, v32, p. 661-679. [Recipient of 2005 WILDLIFE PUBLICATIONS AWARD – OUTSTANDING ARTICLE, THE WILDLIFE SOCIETY.]
- Greene, C. R. Jr., M. W. McLennan, R. G. Norman, **T. L. McDonald**, R. S. Jakubczak, and W. J. Richardson (2004) "Directional frequency and recording (DIFAR) sensors in seafloor recorders to locate calling bowhead whales during their fall migration", *Journal of Acoustical Society of America*, v116, p. 799–813.
- McDonald, T. L.** (2004) "Estimation of resource selection functions when used and available samples overlap", in *Resource Selection Methods and Applications*, S. Huzurbazar ed., Western EcoSystems Technology, Inc., 2003 Central, Cheyenne, WY, 82001.
- Amstrup, S. C., G. York, **T. L. McDonald**, R. Nielson, and K. Simac (2004) "Detecting denning polar bears with forward looking infra-red (FLIR) imagery", *BioScience*, v54, p. 337-344.
- Lacroix, D. L., R. B. Lanctot, J. A. Reed, and **T. L. McDonald** (2004) "Effect of underwater seismic surveys on molting male Long-tailed Ducks in the Beaufort Sea, Alaska", *Canadian Journal of Zoology*, v81, p. 1862-1875.
- Franklin, A. B., R. J. Gutiérrez, J. D. Nichols, M. E. Seamans, G. C. White, G. S. Zimmerman, J. E. Hines, T. E. Munton, W. S. LaHaye, J. A. Blakesley, G. N. Steger, B. R. Noon, D. W. H. Shaw, J. J. Keane, **T. L. McDonald**, and S. Britting (2004) "Population Dynamics of the California Spotted Owl (*Strix occidentalis occidentalis*): A Meta-Analysis", *Ornithological Monographs*, No. 54.
- Kern, J. W., **T. L. McDonald**, S. C. Amstrup, G. M. Durner, and W. E. Erickson (2003) "Bootstrap Estimates of Utilization Distributions Using the Fast Fourier Transform", *Environmental and Ecological Statistics*, v10, p. 405-418.
- McDonald, T. L.**, Amstrup, and B. F. J. Manly (2003) "Tag loss can bias Jolly-Seber capture-recapture estimates", *Wildlife Society Bulletin*, v31, p. 814-822.
- Manly B. F. J., **T. L. McDonald**, S. C. Amstrup, and E. V. Regehr (2003) "Improving Size Estimates of Open Animal Populations by Incorporating Information on Age", *BioScience*, v53, p. 666-669.
- McDonald, T.L.** (2003) "Review of Environmental Monitoring Methods: Survey Designs", *Environmental Monitoring and Assessment*, v. 85, p. 277-292. [#1 VIEWED ARTICLE, KLUWER EMSWEB SITE, JAN 2004 – APRIL 2005]
- McDonald, T.L.**, and L.L. McDonald (2002) "A New Ecological Risk Assessment Procedure Using Resource Selection Models and Geographic Information Systems", *Wildlife Society Bulletin*, v30, p. 1015-1021.
- Hamm, K. A., L. V. Diller, R. R. Klug, and **T. L. McDonald** (2002) "Spatial Independence of Fisher (*Martes pennanti*) Detections at Track Plates in Northwestern California", *American Midland Naturalist*, v149, p. 201-210.
- Moulton, V. D., W. J. Richardson, **T. L. McDonald**, R. E. Elliott, and M. T. Williams, (2002) "Factors Influencing Local Abundance and Haul-Out Behavior of Ringed Seals on Landfast Ice of the Alaskan Beaufort Sea", *Canadian Journal of Zoology*, v80, p. 1900-1917.
- Manly, B. F. J., L. L. McDonald, D. A. Thomas, **T. L. McDonald**, and W. E. Erickson (2002) *Resource Selection by Animals, Statistical Design and Analysis for Field Studies, 2nd Edition*, Dordrecht, Netherlands: Kluwer Academic Publishers.
- Smith, B. L., and **T. L. McDonald** (2002) "Criteria to improve age classification of antlerless elk", *Wildlife Society Bulletin*, v30, p. 200-207.
- Amstrup, S. C., G. M. Durner, **T. L. McDonald**, D. M. Mulcahy, and G. W. Garner (2001) "Comparing movement patterns of satellite-tagged male and female polar bears", *Canadian Journal of Zoology*, v79, p. 2147-2158.
- McDonald, T.L.** (2001) "The Occupancy Problem", in *Encyclopedia of Environmetrics*. A. El-Shaarawi and W. Piegorisch eds., John Wiley & Sons, New York.
- McDonald, T. L.**, and S. C. Amstrup (2001) "Estimation of Population Size Using Open Capture-Recapture Models", *Journal of Agricultural, Biological, and Environmental Statistics*, v6, p. 206-220.
- Amstrup, S. C., and **T. L. McDonald** (2001) "Polar Bears in the Beaufort Sea: A 30 Year Mark-Recapture Case History", *Journal of Agricultural, Biological, and Environmental Statistics*, v6, p. 221-234.
- Erickson, W. E., and **T. L. McDonald** (2001) "Statistical Issues in Resource Selection Studies in Radio-Marked Animals". In *Radio Tracking and Animal Populations*, J. Millsaugh and J. Marzluff eds., Academic Press, San Diego CA.



- Durner, G. M., S. C. Amstrup, and **T. L. McDonald** (2000) "Estimating the Impacts of Oil Spills on Polar Bears", *Arctic Research of the United States*, v14, p. 33-37.
- McDonald, T. L.**, W. P. Erickson, and L. L. McDonald (2000) "Analysis of Count Data from Before-After Control-Impact Studies", *Journal of Agricultural, Biological, and Environmental Statistics*, v5(3), p. 262-279.
- Manly, B. F., L. L. McDonald, and **T. L. McDonald** (1999) "The Robustness of Mark-Recapture Methods: A Case Study for the Northern Spotted Owl", *Journal of Agricultural, Biological, and Environmental Statistics*, v4, p. 78-101.
- Erickson, W.E., **T.L. McDonald**, and R. Skinner (1998) "Resource Selection Using GIS Data: A Case Study", *Journal of Agriculture, Biology, and Environmental Statistics*, v3, p. 296-310
- Cronin, M.A., S.C. Amstrup, G.M. Durner, L.E. Noel, W.B. Ballard, and **T.L. McDonald** (1998) "Caribou Distribution During the Post-Calving Period in Relation to Infrastructure in the Prudhoe Bay Oil Field, Alaska", *Arctic*, v51, p. 85-93.
- Steenhof, K., M. N. Kochert, and **T. L. McDonald**, (1997) "Interactive Effects of Prey and Weather on Golden Eagle Reproduction", *Journal of Animal Ecology*, v66, p. 350-362.
- McDonald, T. L.**, D. S. Birkes, and N. S. Urquhart (1996) "Obtaining Species: Sample Size Considerations", *Environmental and Ecological Statistics*, v3, p. 329-347.
- McDonald, T. L.**, and N. S. Urquhart, "Rank Methods Comparing Finite Distribution Functions in Equal Size Populations Under General Designs" in *American Statistical Association 1996 Proceedings of the Section on Statistics and the Environment*, American Statistical Association, 1429 Duke Street, Alexandria, VA, 22314.
- Dumbauld, B. R., D. A. Armstrong, and **T. L. McDonald**, (1993) "Use of Oyster Shell to Enhance Intertidal Habitat and Mitigate Loss of Dungeness Crab (*Cancer magister*) Caused by Dredging", *Canadian Journal of Fisheries*, v20, p. 381-390.
- Armstrong, D.A., P.A. Dinnel, J.M. Orensanz, J.L. Armstrong, **T.L. McDonald**, R.F. Cusimano, R.S. Nemeth, M.L. Landolt, J.R. Skalski, R.F. Lee, and R.J. Huggett (1993) "Status of Selected Bottomfish and Crustacean Species in Prince William Sound following the Exxon Valdez Oil Spill". published in *Proceedings of the Third Symposium on Environmental Toxicology and Risk Assessment: Aquatic, Plant, and Terrestrial*. Atlanta, Georgia. American Standards and Testing Materials (ASTM). Philadelphia, PA.
- McDonald, T. L.** (1992) "An Easy-to-Use Double-Entry Routine." published in *Proceedings of the 17th SAS Users Group International (SUGI 17) Meeting*. Honolulu, Hawaii. SAS Institute. Cary, NC.
- Graham, C. E., and **T. L. McDonald** (1991) "Seasonal Influences on Birth and Postpartum Events in Captive Chimpanzees.", *Primate Today*. Akiyoshi Ehara et al., editors. Elsevier Science Publishers B.V. Amsterdam.
- Graham, C. E., E. J. Struthers, W. C. Hobson, **T. L. McDonald**, C. Faiman, M. T. Buckman, and D. C. Collins (1991) "Postpartum Infertility in Common Chimpanzees", *American Journal of Primatology*, v24, p. 245-255.
- Johnson, D. H., M. C. Hammond, **T. L. McDonald**, C. L. Nustad, and M. D. Schwartz (1989) "Breeding Canvasbacks: A Test of a Habitat Model", *Prairie Naturalist*, v21, p. 193-202

### **PUBLICATIONS IN PROGRESS**

- Amstrup, S. C., G. M. Durner, **T. L. McDonald**, W. Johnson (in prep) "Estimating potential effects of hypothetical oil spills on polar bears"
- Richardson, W. J., **T. L. McDonald**, C. R. Greene, S. B. Blackwell, and B. Streever (in prep) "Effects of Northstar on distribution of calling bowhead whales, 2001–2004".

### **WORKSHOP INSTRUCTION**

- Resource Selection by Animals** Juneau Alaska, 2003; Laramie Wyoming, 2003; Nashville Tennessee, 2000; Sacramento California, 1999; Seattle Washington, 1998; Kodiak Alaska, 1998; Buffalo New York, 1998; Snowmass Colorado, 1997, Laramie Wyoming, 1997
- Computer Intensive Methods in Biology** – Manhattan Kansas, 1999; Woods Hole Massachusetts, 1998; Laramie Wyoming, 1997
- Capture-Recapture Methodology** – Pretoria, South Africa, 2010; Webinar, 2009, Tucson Arizona, 2007; Laramie Wyoming, 1997



### THESES

**DOCTORATE:** "Analysis of Finite Population Surveys: Sample Size and Testing Considerations."  
Department of Statistics, Oregon State University, June 1996.

**MASTERS:** "An Evaluation of Estimators for Rangeland Utilization", Department of Experimental  
Statistics, New Mexico State University, July 1992.