

Dr. M. Tim Tinker, Curriculum Vitae

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Academic Record

University of California, Santa Cruz, CA

PhD Ecology and Evolutionary Biology, 1998-2004

Dissertation Research: Population biology and foraging behavior of the southern sea otter

University of Waterloo, Ontario, Canada

M.Sc., Biology, 1991-1993

Thesis: Behavioral ecology and energetics of grey seals (*Halichoerus grypus*) on land-fast ice

University of Guelph, Ontario, Canada

Honors B.Sc., Zoology, 1986-1990

Specialization: Wildlife Biology

Appointments

- Research Scientist, US Geological Survey, Western Ecological Research Center, 2008 -
- Adjunct Professor, UC Santa Cruz, Ecology and Evolutionary Biology, 2008 -
- Assistant Research Biologist, UC Santa Cruz, Ecology and Evolutionary Biology, 2007-2008
- Post-doctoral researcher, UC Santa Cruz, Ecology and Evolutionary Biology, 2004-2007

Grants, Awards and Scholarships

- Research Grant from California Coastal Commission: "Investigating the Consequences of Coastal Contamination and Anthropogenic Stressors for Sea Otter Recovery", 2008
- Research Grant from National Science Foundation and National Institutes of Health "Ecology of Infectious Diseases" Program: Understanding the ecological determinants of transmission of *T. gondii* from terrestrial hosts to southern sea otters (Collaboration with Scientists from UC Davis, UC Berkeley, Institute of Ecosystem Studies, University of British Columbia, CSU Fresno, and others), 2005
- Research Grants from Monterey Bay National Marine Sanctuary and Marine Mammal Commission: Nutritional composition of sea otter diets (Collaboration with Scientists from Smithsonian Institute and UC Santa Cruz), 2004
- Multi-year Research Grant from Minerals Management Service: Population biology of the southern sea otter in California (Co-Principal Investigator with Scientists from USGS, CDFG, UC Santa Cruz, Smithsonian Institute and others), 2001
- Research Grant from Friends of the Sea Otter: Development of a Spatially Explicit Population Model for the Southern Sea Otter, 2000
- Recognition award for excellence as a teaching assistant, University of Waterloo, 1992
- Research fellowship from Department of Biology, University of California-Santa Cruz, 1998

Primary Publications

Tinker, M. T., M. Mangel, and J. A. Estes. *in press*. Learning to be different: acquired skills, social learning, frequency dependence and environmental variation can cause behaviorally-mediated foraging specializations.

Newsome, S.D., M.T. Tinker, D.H. Monson, O.T. Oftedal, K. Ralls, M. Staedler, M.L. Fogel, and J.A. Estes. *in press*. Using stable isotopes to investigate individual diet specialization in California sea otters (*Enhydra lutris nereis*). *Ecology*.

Johnson, C.K., Tinker, M.T., Estes, J.A., Conrad, P.A., Staedler, M., Miller, M.A., Jessup, D.A. and Mazet, J.A.K. 2009. Prey choice and habitat use drive sea otter pathogen exposure in a resource-limited coastal system. *Proceedings of the National Academy of Sciences* 106(Early Edition).

Tinker, M. T., D. F. Doak, and J. A. Estes. 2008. Using demography and movement behavior to predict range expansion of the southern sea otter. *Ecological Applications* 18(7) 1781-1794.

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- Peckham, S.H., D. Maldonado Diaz, V. Koch, A. Mancini, A. Gaos, M. T. Tinker, W.J. Nichols. 2008. High mortality of loggerhead turtles due to bycatch, human consumption and strandings at Baja California Sur, Mexico, 2003 to 2007. *Endangered Species Research* 5(2-3).
- Tinker, M.T., J.A. Estes and G. Bental. 2008. Food limitation leads to behavioral diversification and dietary specialization in sea otters. *Proceedings of the National Academy of Sciences* 105(2) 560-565
- Doak, D.F., J.A. Estes, B.S. Halpern, U. Jacob, D.R. Lindberg, J.R. Lovvorn, D.H. Monson, M.T. Tinker, et al. 2008. Understanding and predicting ecological dynamics: are major surprises inevitable? *Ecology* 89:952-961.
- Jessup, D.A., M.A. Miller, C. Kreuder-Johnson, P. Conrad, M.T. Tinker, J.A. Estes and J.A.K. Mazet. 2007. Sea Otters in a Dirty Ocean. *Journal of the American Veterinary Medical Association* 231(11): 1648-1652
- Tinker, M.T., D.P. Costa, J.A. Estes and N. Wieringa. 2007. Individual dietary specialization and dive behaviour in the California sea otter: using archival time-depth data to detect alternative foraging strategies. *Deep Sea Research II* 54:330-342.
- Tinker, M.T., D.F. Doak, J.A. Estes, B.B. Hatfield, M.M. Staedler, and J.L. Bodkin. 2006. Incorporating diverse data and realistic complexity into demographic estimation procedures: a case study using the California sea otter, *Enhydra lutris nereis*. *Ecological Applications* 16:2293-2312.
- Laidre, K.L., J.A. Estes, M.T. Tinker, J. Bodkin, D. Monson and K. Schneider. 2006. Patterns of growth and body condition in sea otters from the Aleutian archipelago before and after the recent population decline. *Journal of Animal Ecology* 75: 978-989
- Estes, J.A., M.T. Tinker, A.M. Doroff and D.M. Burn. 2005. Continuing sea otter population declines in the Aleutian Archipelago. *Marine Mammal Science* 21:169–172.
- Gerber, L.R., M.T. Tinker, J.A. Estes, D.F. Doak and D. Jessup. 2004. Mortality sensitivity in life-stage simulation analysis: A case study of southern sea otters. *Ecological Applications*, 14:1554–1565.
- Estes, J.A., E.M. Danner, D.F. Doak, B. Konar, A.M. Springer, P.D. Steinberg, M.T. Tinker, and T.M. Williams. 2003. Complex trophic interactions in kelp forest ecosystems. *Bulletin of Marine Science*, 74: 621-638.
- Burn, D.M., A.M. Doroff and M.T. Tinker, 2003. Carrying Capacity and pre-decline abundance of sea otters (*Enhydra lutris kenyoni*) in the Aleutian Islands. *Northwestern Naturalist* 84(3): 145-148
- Doroff, A.M., J.A. Estes, M.T. Tinker, D.M. Burn and T.J. Evans. 2003. Sea otter population declines in the Aleutian Archipelago. *Journal of Mammalogy*, 84(1): 55-64
- Estes, J.A., M.L. Riedman, M.M. Staedler M.T. Tinker, B.E. Lyon. 2003. Individual variation in prey selection by sea otters: patterns, causes, and implications. *Journal of Animal Ecology*, 72(1): 144-155
- Estes, J.A., M.T. Tinker, T.M. Williams, D.F. Doak. 1998. Killer whale predation on sea otters links oceanic and nearshore ecosystems. *Science*, 282: 473-476
- Hatfield, B.H., D. Marks, M.T. Tinker, K. Nolan, J. Pierce. 1998. Attacks on sea otters by killer whales. *Marine Mammal Science* 14(4): 888-894.
- Estes, J.A., D.F. Doak, J.R. Bodkin, R.J. Jameson, D. Monson, J. Watt, M.T. Tinker. 1996. Comparative Demography of Sea Otter Populations. *Endangered Species Update* 13(12): 11-13
- Watt, J.P., B.T. Krausse, M.T. Tinker. 1995. Bald Eagles kleptoparasitizing sea otters at Amchitka Island, Alaska. *Condor* 97(2): 588-590
- Tinker, M.T., K.M. Kovacs, M.O. Hammill. 1995. Behavior and energetics of male gray seals (*Halichoerus grypus*) breeding on landfast ice. *Behavioral Ecology & Sociobiology* 36:159-170

Professional Activities

Research Positions:

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- 2008- present: Principal Investigator, USGS Santa Cruz Field Station of the Western Ecological Research Center, heading studies of sea otter population biology and near-shore marine ecology
- 2000-2007: Co-Principle Investigator for long-term, telemetry-based study of sea otter demography and foraging ecology in California. Supervisor: Dr. James Estes
- 1991-93: Research Assistant for studies of reproductive and behavior energetics of ice-breeding seals in eastern Canada. Advisor: Dr. Kit Kovacs

Teaching Positions:

- Readings in Ecology (Bio 293): Core Graduate Course in Ecology and Evolutionary Biology, UC Santa Cruz, CA, 2008
- Teaching Assistant for Undergraduate Courses in Biology of the Cell, Probability and Statistics, Psychobiology: UC Santa Cruz, CA, 1998-99
- Teaching Assistant for Undergraduate Course in Comparative Vertebrate Anatomy, University of Waterloo, Ontario, 1991-92

Professional Society Memberships:

- Member of The Society for Marine Mammalogy, 1991-2008
- Member of the Ecological Society of America, 2005-2008

Reviewer for:

- The American Naturalist
- Ecology
- Proceedings of the Royal Society
- Marine Mammal Science
- Ecological Applications
- Animal Behavior
- Population Ecology
- Canadian Journal of Fisheries and Aquatic Science

Workgroup and Committee Memberships:

- Member of Southwest Alaska Sea Otter Recovery Team (SWAKSORT) convened by US FWS
- Invited participant, Marine Mammal Commission symposium to advise on the use of population viability analysis in marine mammal populations. Savannah, GA, Sept 2005 (report requested by US Congress)
- Invited participant, Marine Mammal Commission symposium to determine the ecological role of killer whales in the north Pacific. Seattle, WA, Apr. 2005 (report requested by US Congress)
- Invited participant, US Fish and Wildlife Service workshop to develop long-term monitoring plan for sea otters in south-west Alaska. Anchorage, AK, Feb. 2005.
- Invited participant, Alaska Sea Life Center/US Fish and Wildlife Service symposium to determine research priorities for the sea otter in south-west Alaska. Seward, AK, Apr. 2004.
- Invited participant, US Fish and Wildlife Service workshop to study sea otter decline in south-west Alaska. Anchorage, AK, Apr. 2002.

Research Related Employment:

- Feb-Aug 1998: Development of a Long Term Large Mammal Monitoring Plan, BC
Columbia Basin Fish and Wildlife Compensation Program
- Apr-Sep 1997: Sea otter contaminant levels & population ecology in Alaska *USGS-Biological Resources Division, Santa Cruz Field Station, CA*
- Mar-Jul 1997: Analysis of Long-term Ungulate Aerial Survey Data
Columbia Basin Fish and Wildlife Compensation Program
- Aug-Oct 1996: Database development/analysis, sea otter monitoring programs
USGS-Biological Resources Division, Santa Cruz Field Station, CA
- June 1995-Aug 96: Sea otter ecology study, Adak Island, Alaska
University of California, Santa Cruz, California, USA
- July-Sept 1994: Harbor porpoise by-catch program
Huntsman Marine Science Centre, St. Andrews, New Brunswick, Canada
- Nov 1993-Mar 94: Sea otter ecology study, Amchitka Island, Alaska
University of Santa Cruz, California, USA

Professional Technical Reports:

Dr. M. Tim Tinker, Curriculum Vitae

- Oftedal, O., K. Ralls, M.T. Tinker and A. Green. 2008. Nutritional constraints on the southern sea otter in the Monterey Bay National Marine Sanctuary, and a comparison to sea otter populations at San Nicolas Island, California and Glacier Bay, Alaska. Final Report to the Monterey Bay National Marine Sanctuary and the Marine Mammal Commission.
- Tinker, M. T., J. A. Estes, K. Ralls, T. M. Williams, D. Jessup, and D. P. Costa. 2005. Population Dynamics and Biology of the California Sea Otter (*Enhydra lutris nereis*) at the Southern End of its Range. MMS OCS Study DRAFT REPORT. Page 351. MMS Cooperative Agreement Number 14-35-0001-31063. Coastal Research Center, Marine Science Institute, University of California, Santa Barbara, California.
- Tinker, M.T., Estes, J.A., Doak, D.F. 2000. Development of a spatially explicit population model to assess potential population impacts associated with translocation of sea otters from south of Pt. Conception. Final Report for Friends of the Sea Otter, October, 2000. Monterey, California.
- Estes, J.A., Konar, B., Tinker, M.T. 1998. Sea Otter Population Biology and Subtidal Community Ecology at Shemya Island, Alaska. Final Report for Department of Defense Legacy Project Number 9401280 & 9510014
- Tinker, M.T., Estes, J.A. 1997. Summary Report on Sea Otter Captures for Blood Contaminant Analysis and Collection of Population Data in the Western Aleutian Islands, 1997. Summary Report to the Navy, U.C. Santa Cruz, CA.
- Tinker, M.T., Heaven, P.C., Ingham, L. 1997. Columbia Basin, Large Mammal Monitoring: 1994-97 Aerial Surveys, Final Report. Columbia Basin Fish and Wildlife Compensation Program, Technical Report
- Tinker, M.T., Estes, J.A. 1996. The population ecology of sea otters at Adak Island, Alaska. Final Report to the Navy, Contract # N68711-94-LT-4026, U.C. Santa Cruz, CA.

Selected Invited Talks and Presentations at Professional Meetings

- Invited Speaker at UC Santa Cruz EE Biology Seminar Series, June 2008: "Sea otter diets & population status: causes and consequences of individual foraging specializations"
- Tinker, M.T., G. Bental, A. Burdin, and J.A. Estes. 2007. Ecological and behavioral responses to K: sea otters and kelp forest ecosystems in the Aleutian and Commander islands. 17th Biennial Conference on the Biology of Marine Mammals, Cape Town, South Africa
- Invited Speaker at Bodega Marine Laboratories Seminar Series, Jan 2007: "Sea otter diets & population status: causes and consequences of individual foraging specializations"
- Tinker, M.T., C. Kreuder-Johnson, P. Conrad, M. Staedler, D. Jessup, J. Estes, M. Miller and J. Mazet. 2007. Linking Individual Behavior and Population Health: Tracking Protozoal Pathogen Exposure in Southern Sea Otters. 5th Workshop on Sea Otter Conservation, Seattle, WA.
- Tinker, M.T., C. Kreuder-Johnson. 2006. Linking Individual Behavior and population health: a multidisciplinary approach to predicting risk of disease exposure in sea otters. 20th Annual Meeting of the Society for Conservation Biology, San Jose, CA
- Tinker, M.T., J.A. Estes, M.M. Staedler, J.L. Bodkin. 2005. Alternative diet specializations in the southern sea otter: energetic implications of a behaviorally-mediated foraging polymorphism. 16th Biennial Conference on the Biology of Marine Mammals, San Diego, CA
- Tinker, M.T., D.F. Doak, J.A. Estes. 2005. Effect of demographic variation and dispersal patterns at multiple spatial scales on the population recovery and range expansion of a threatened carnivore. 90th Annual Meeting of the Ecological Society of America, Montreal, Canada
- Tinker, M.T., D.P. Costa, J.A. Estes, N. Wieringa. 2005. Individual dietary specialization and dive behavior in the California sea otter: using archival time-depth data to detect alternative foraging strategies. 2nd International Bio-logging Science Symposium, St. Andrews, Scotland.
- Gerber, L. R., M.T. Tinker, Estes, J.A., Doak, D.F. 2002. Mortality sensitivity in life-stage simulation analysis: A case study of southern sea otters. Ecological Society of America Annual Meeting Abstracts 87: 139.
- Tinker, M.T., Doak, D.F. 2002. Southern Sea Otter Demography and Population Analyses. Carnivores 2002 From the Mountains to the Sea: A Conference on Carnivore Biology & Conservation, Monterey, CA
- Bodkin, J., Staedler, M.M., Tinker, M.T., Estes, J.A. 2002. Assessing Population Status Using Activity Budgets: Inter- and Intra-Population Differences in Foraging Effort. Carnivores 2002 - From the Mountains to the Sea: A Conference on Carnivore Biology and Conservation, Monterey, CA
- Tinker, M.T., Estes, J.A., Staedler, M.M., Bodkin, J. 2002. Sea otter Foraging Ecology: Sources of Variation in Dive Behavior, Diet and Foraging Success. Carnivores 2002 - From the Mountains to the Sea: A Conference on Carnivore Biology and Conservation, Monterey, CA
- Kage, A.K., Tinker, M.T., Doak, D.F. 2002. Application of Individual Based Movement Models to Movement Patterns of California Sea Otters (*Enhydra lutris nereis*). Carnivores 2002 - From the Mountains to the Sea: A Conference on Carnivore Biology and Conservation, Monterey, CA

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- Yeates, L., Williams, T.M., Tinker, M.T. 2002. Thermoregulation and Diving Energetics of the California Sea Otter: Are They Pushing Their Psychological Limits? *Carnivores 2002 - From the Mountains to the Sea: A Conference on Carnivore Biology and Conservation*, Monterey, CA
- Tinker, M.T., Estes, J.A., Yeates, L., Staedler, M.M. 2002. Studying Sea otter Foraging Ecology. *California and the World Ocean '02*, Santa Barbara, CA
- Tinker, M.T., Estes, J.A., Mangel, M. 2001. Individual variation in diet and feeding behavior of sea otters: cultural transmission of foraging skills contributes to the persistence of alternative foraging specializations. Invited Presentation at the *Workshop on Culture in Marine Mammals*, Fourteenth Biennial Conference on the Biology of Marine Mammals, Vancouver, British Columbia
- Doroff, A., Estes, J.A., Tinker, M.T., Burn, D., Evans, T. 2001. Sea otter decline in the Aleutian Islands. Fourteenth Biennial Conference on the Biology of Marine Mammals, Vancouver, British Columbia
- Tinker, M.T., Estes, J.A., Doak, D.F. 2000. A Model of Southern Sea Otter Population Dynamics and Range Expansion. Seventh Joint US-Russia Sea Otter Workshop, Monterey, California
- Tinker, M.T., Estes, J.A. 1999. A comparison of indices used to assess sea otter population status: scats may be worth a closer look. Thirteenth Biennial Marine Mammal Conference, Maui
- Tinker, M.T., Estes, J.A. 1997. Is food-limitation causing the sea otter population decline at Adak Island, Alaska? Contrary evidence from activity budgets, diet and prey Size. Twelfth Biennial Conference on the Biology of Marine Mammals, Monaco
- Tinker, M.T., Estes, J.A. 1997. Sea otter population decline in the western Aleutian Islands: an overview of trends, effects and possible causes. Sixth Joint US-Russia Sea Otter Workshop, Forks, Washington
- Estes, J.A., Duggins, D.O., Tinker, M.T. 1997. Sea otters as "Umbrella Species" in Kelp Forest Ecosystems. The Society for Conservation Biology 1997 Annual Meeting, Victoria, BC
- Tinker, M.T., Estes, J.A., Meehan, J. 1996. Demography, behavior and diet of sea otters at Adak Naval Reservation, Alaska. The Wildlife Society Third Annual Conference, Cincinnati, Ohio
- Tinker, M.T., Kovacs, K.M., Hammill, M.O. 1993. Reproductive behavioral tactics of male grey seals breeding on landfast ice. Tenth Biennial Conference on the Biology of Marine Mammals, Galveston, Texas

Community Outreach

Educational talks:

- Guest Lecturer for Undergraduate Classes:
 - ❖ Disease Ecology, UC Davis, 2007
 - ❖ Kelp Forest Ecology, UCSC, 2003-2006
 - ❖ Biology of Marine Mammals, UCSC, 2000-2006
- Invited speaker at various public-outreach presentations:
 - ❖ Sea otter awareness week guest lectures (2005, 2006, 2008)
 - ❖ Long Marine Lab Seymour Interpretive Center Scientific Series (Santa Cruz, CA)
 - ❖ Aptos High School Advanced Program Biology class (2006 & 2007)
 - ❖ Monterey Bay Aquarium Volunteer Docents (Monterey, CA)
 - ❖ Seymour Interpretive Center Volunteer Docents (Santa Cruz, CA)
 - ❖ Friends of the Sea Otter Annual General Meeting (2004)
 - ❖ Long Beach Interpretive Center (Toffino, British Columbia)
 - ❖ Society of British Columbia Naturalists (Victoria, British Columbia)

Volunteer Services:

- Student representative for Chancellors Animal Resource Committee (CARC) on the ethical treatment of animals, 1998-2000
- Science Fair Judge, 2000-2006: Local (Valencia Public School) and Regional School Science Fair Competitions, Santa Cruz County
- 1994-95: Educational speaker for school groups
"Scientists in the Schools Program", *Science World*, Vancouver, BC, Canada
- 1991-92: Volunteer Environmental and Biological consultant
Environmental Advisory Network of Waterloo, Ontario, Canada

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- 1988-89: Wild Bird Rehabilitation and Public Education
University of Guelph Wild Bird Clinic