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My research seeks to understand environmental trade-offs and complementarities among activities related to energy production (hydropower, bioenergy, gas & oil). My research goal is to quantify ecological benefits of energy alternatives so that they can be brought into the decision-making arena. This goal has been advanced for hydropower by modeling responses of riverine fishes to modifications to flow, temperature, and connectivity. My research in conservation biology has focused on understanding effects of energy activities on small, fragmented populations and how risk is influenced by life history. The quantitative tools applied to these problems include ecological statistics, regional-scale empirical models, population models, and optimization heuristics.

CURRENT RESEARCH QUESTIONS

- How will introducing bioenergy crops into the agricultural landscape will influence water quality and aquatic biodiversity on a large regional-scale? (Sponsor: DOE-OBP)
- Under what circumstances would there be a benefit to adding a new population of the threatened Snake River Fall Chinook salmon above the Hell's Canyon complex? (Idaho Power Co.)
- How can we time pulse flows to maximize fish production and minimize loss of energy to spill? (DOE-EERE)

INVITED PRESENTATIONS, SYMPOSIA ORGANIZED, REVIEWS

- Local organizing committee, Annual Meeting of the Society of Mathematical Biology, Knoxville, TN. (2012)
- Presentation to Columbia Basin Sturgeon Workshop on sturgeon passage, Northwest Power PLanning Council (2012)
- Scientific review of Alternative San Joaquin River Flow Objectives for the Protection of Fish and Wildlife for California EPA (2011)
- Peer review of USEPA Conceptual Models for Biofuel Feedstock Production (2011)
- Presentation to the Center for BioEnergy Sustainability Workshop "Billion Ton Study...Sustainability" (2011)
- Great Lakes Fishery Trust Workshop, "Enhancing Lake Sturgeon Passage at Hydroelectric Facilities," (2011)
- NMFS Sturgeon workshop - Recovery measures for Atlantic and shortnose sturgeon in Alexandria, VA (2011)
- Symposium "Shifting Landscapes: Biomass and Biodiversity" 2010 Intern'l Assoc. Landscape Ecologists, Athens, GA www.esd.ornl.gov/~zij/IALE_symposium/
- EPA-DOE Joint workshop "A Watershed Perspective on Bioenergy Sustainability" (2010)
- Gulf Sturgeon Modeling Review Panel (2009), Cedar Key, Florida
- NSF Workshop "Computational Science for Natural Resource Managers," Keynote (2007)

EDUCATION

PhD 2000, Ecology and Evolutionary Biology,
University of Tennessee
MS 1984, Ecology
University of Tennessee
BA 1979, Biology
Franklin Pierce College
(SUNY ESF)

PROFESSIONAL EXPERIENCE

1988-Present Research scientist
Environmental Sciences Division,
Oak Ridge National Laboratory
2003-Present Adjunct faculty, Ecology &
Evolutionary Biology, University of
Tennessee

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- San Joaquin River Fall Chinook Salmon Modeling Review (2006), California Dept of Fish & Game.
- Scientific Committee, “Fish and Diadromy in Europe,” Conference, Bordeaux, France (2005)
- Pallid Sturgeon Review Panel for the US Army Corps of Engineers (2004-2005)
- Everglades Model Review Team for the US Geologic Service, Miami, FL (2002-2003)
- Panel discussion, Hydropower Relicensing and the Environment, WaterPower , Orlando, FL (1998)

AWARDS & EDITORIAL POSITIONS

Scientific Achievement Award, Environmental Sciences Div., Oak Ridge National Laboratory (2006)

DOE Outstanding Mentor Award (2006)

ORNL Technical Publication Award (2001) for Jager et al. 2000. *Ecosystems* 3: 396-411

Ecological Society of America, Southeast Chapter Secretary-Treasurer (2002—2004)

Associate Editor for the North American Journal of Fisheries Management (2001-2002)

PEER-REVIEWED PUBLICATIONS

Book Chapters

Efroymsen RA, **HI Jager**, & W Hargrove. 2010. Valuing wildlands. Pages 157-185 In *Environmental Risk Assessment and Management from a Landscape Perspective*, L Kapustka, W Landis, and A Johnson (editors). John Wiley & Sons.

Jager HI, KA. Rose & A Vila-Gispert. 2008. Life history correlates and extinction risk of capital breeding fishes. Pages 15-25 In *Fish and Diadromy in Europe*. Proceedings of the symposium held 29 March-1 April, 2005, Bordeaux, France, Dufour, Prevost, Rochard, and Williot (eds.). Springer, Amsterdam.

Jager HI, MS Bevelhimer, KA Lepla, JB Chandler, W Van Winkle. 2007. Evaluation of Reconnection Options for White Sturgeon in the Snake River Using a Population Viability Model. Pages 319-335 In *Proceedings of the Symposium on Anadromous Sturgeons*. J.F. Munro et al., ed., American Fisheries Society Symposium 56, American Fisheries Society, Bethesda, MD.

Van Winkle W, BD Holcomb, **HI Jager**, JA Tyler, SY Whitaker, and BJ Shuter. 1995. Regulation of energy acquisition and allocation to respiration, growth, and reproduction: simulation model and example using rainbow trout. *IN* RC Chambers and EA Trippel, (eds.), *Early Life History and Recruitment in Fish Populations*, Chapman and Hall.

Jager HI & WS Overton. 1993. Explanatory models for ecological response surfaces. Chapter 42, pp. 422 - 437 *IN* Goodchild, M.F., B.O. Parks, and L.T. Steyaert (eds.), *Environmental Modeling with GIS*. Oxford University Press, NY.

Cook, RB & **HI Jager**. 1991. Upper Midwest: The effects of hydrologic lake type and acidic deposition on lakewater chemistry. Chapter 13 *IN* D.F. Charles (ed.). *Acidic Deposition and Aquatic Ecosystems: Regional Case Studies*. Springer-Verlag, New York.

Journal Articles

Schweizer P & **HI Jager**. 2011. Modeling fish diversity in the Arkansas-Red-White River Basin. *Transactions of the American Fisheries Society* 140(5): 1227-1239. (<http://dx.doi.org/10.1080/00028487.2011.618354>)

Jager, H.I., M.S. Bevelhimer, R.L. King, and K.A. Smith. 2011. Landscape influences on headwater streams on Fort Stewart, Georgia, USA. *Environmental Management* 4:795-807 (<http://dx.doi.org/10.1007/s00267-011-9722-4>)

Perkins TA and **HI Jager**. 2011. A conditional strategy model accounts for spatiotemporal life history variation in Snake River fall Chinook salmon. *Transactions of the American Fisheries Society* 140(4): 959-972.

McBride AC, VH Dale, LM Baskaran, ME Downing, LM Eaton, RA Efroymsen, CT Garten Jr, KL Kline, **HI Jager**, PJ Mulholland, ES Parish, PE Schweizer, & J.M. Storey. 2011. Indicators to support environmental sustainability of bioenergy systems. *Ecological Indicators* 11(5): 1277-1289.

Jager HI, KB Lepla, W Van Winkle, BA James, & SO McAdams. 2010. The elusive minimum viable population size

- for white sturgeon. *Transactions of the American Fisheries Society* 139: 1551-1565.
- Baskaran, LM, **HI Jager**, PE Schweizer & R Srinivasan. 2010. Progress toward evaluating the sustainability of switchgrass production at a regional scale. *American Society of Agricultural and Biological Engineers* 53(5): 1547-1556.
- Jager HI, LM Baskaran, CC Brandt, EB Davis, CA Gunderson & SD Wullschleger. 2010. Empirical geographic modeling of switchgrass yields in the United States. *Global Change Biology: Bioenergy* 2(5): 248-257.
- Efroymson RA, **HI Jager**, VH Dale, J Westerveld. 2009. A framework for developing management goals for species at risk and application to military installations in the United States. *Environmental Management* 44(6): 1163-1179.
- McCullough, DA, JM Bartholow, **HI Jager** and others. 2009. Research in thermal biology: Burning questions for coldwater stream fishes. *Reviews in Fisheries Science* 17(1): 90-115.
- Jager HI**, KA Rose, & A Vila-Gispert. 2008. Life history correlates and extinction risk of capital-breeding fishes. *Hydrobiologia* 602: 15-25.
- Jager HI** & BT Smith. 2008. Sustainable Reservoir Operation: Can we generate hydropower and preserve ecosystem values? *River Research and Applications* 24: 340-352.
- Jager HI** & MS Bevelhimer. 2007. How run-of-river operation affects hydropower generation. *Journal of Environmental Management* 40: 1004-1015.
- Jager HI** 2006. Chutes and ladders and other games we play with rivers: I. Simulated effects of upstream passage on white sturgeon. *Canadian Journal of Fisheries and Aquatic Sciences* 63: 165-175.
- Jager HI** 2006. Chutes and ladders and other games we play with rivers: II. Simulated effects of translocation on white sturgeon. *Canadian Journal of Fisheries and Aquatic Sciences* 63: 176-184.
- Jager HI**, EA Carr & RA Efroymson. 2006. Simulated effects of habitat loss and fragmentation on a solitary, mustelid predator. *Ecological Modelling* 91: 416-430.
- Jager HI** 2005. Genetic and demographic implications of aquaculture on white sturgeon (*Acipenser transmontanus*) conservation. *Canadian Journal of Fisheries and Aquatic Sciences*. 62(8): 1733-1745
- Jager HI**, RA Efroymson, K. Sublette & T.A. Ashwood. 2005. Unnatural landscapes in ecology: Generating the spatial distribution of brine spills. *Environmetrics* 16: 687-698.
- Jager HI**, AW King, NH Schumaker, TL Ashwood & BL Jackson. 2005. Spatial uncertainty analysis of population models. *Ecological Modelling* 185(1): 13-27.
- Jager HI** & AW King. 2004. Spatial uncertainty and ecological models. *Ecosystems* 7: 1-7.
- Efroymson, RA, Carlsen TM, **Jager, HI**, et al. 2004. Pages 261-285 *In* Toward a Framework for Assessing Risk to Vertebrate Populations from Brine and Petroleum Spills at Exploration and Production Sites, Landscape Ecology and Wildlife Habitat Evaluation, ASTM STP 1458, L. Kapustka et al. (eds.), ASTM International, West Conshohocken, PA.
- Sullivan, AB, **Jager HI** & R Myers. 2003. Modeling white sturgeon movement in a reservoir: The effect of water quality. *Ecological Modelling* 167(1-2): 97-114.
- Jager HI** & KA Rose. 2003. Designing optimal flow patterns for fall Chinook salmon recruitment in a Central Valley, California river. *North American Journal of Fisheries Management* 23: 1-21.
- Jager HI**, W Van Winkle, KA Lepla, JB Chandler, P Bates, & TD Counihan. 2002. Factors controlling white sturgeon recruitment in the Snake River. Pages 127--150 *In*: W Van Winkle, PJ Anders, DH Secor, & DA Dixon, eds., *Biology, Management, and Protection of Sturgeon*, American Fisheries Society Symposium 28, American Fisheries Society, Bethesda, MD.
- Jager HI**. 2001. Individual variation in life history characteristics can influence population extinction risk. *Ecological Modelling* 144(1): 59-74.
- Jager HI** & JA Tyler. 2001. Letter to the editor concerning Railsback et al. 1999. Movement rules for individual-based models of stream fish. *Ecological Modelling* 144(3): 245-248.

- Jager HI**, W Van Winkle, K Lepla, & J Chandler. 2001. A theoretical study of river fragmentation by dams and its effects on white sturgeon populations. *Environmental Biology of Fishes* 60: 347-361.
- Jager HI**, W Van Winkle, K Lepla, J Chandler, and P Bates. 2000. Population viability analysis of riverine fishes. Special issue of the *Journal of Environmental Science and Policy* 3: S483-489.
- Jager HI**. 2000. Predicting the viability of fish populations in a modified riverine environment, PhD Dissertation. University of Tennessee, Knoxville.
- Jager HI**, WH Hargrove, CC Brandt, AW King, RJ Olsen, JMO. Scurlock, & KA Rose. 2000. Constructive contrasts between modeled and measured climate responses over a regional scale. *Ecosystems* 3: 396-411.
- Jager HI**, W Van Winkle, & BD Holcomb. 1999. Would hydrologic climate changes in Sierra-Nevada streams influence trout persistence? *Transactions of the American Fisheries Society* 128: 222-240.
- Suter, GW II, LW Barnthouse, RA Efrogmson, & **HI Jager**. 1999. Ecological risk assessment in a large river-reservoir: 2. fish community. *Environmental Toxicology and Chemistry* 18(4): 589-598.
- Van Winkle W, **HI Jager**, SF Railsback, BD Holcomb, TK Studley, & JE Baldrige. 1998. Individual-based model of sympatric populations of brown and rainbow trout for instream flow assessment: model description and calibration. *Ecological Modelling* 110: 175-207.
- Van Winkle W, KA Rose, BJ Shuter, **HI Jager**, & BD Holcomb. 1997. Effects of climatic temperature change on growth, survival, and reproduction of rainbow trout: predictions from a simulation model. *Canadian Journal of Fisheries and Aquatic Sciences* 54: 2526-2542.
- Van Winkle W, CC Coutant, **HI Jager**, and others. 1997. Uncertainty and instream flow standards: perspectives based on research and assessment experience. *Fisheries* 21: 21-22.
- Jager HI**, HE Cardwell, MJ Sale, MJ Bevelhimer, CC Coutant, & W Van Winkle. 1997. Modelling the linkages between flow management and salmon recruitment in streams. *Ecological Modelling* 103: 171-191.
- Cardwell H, **HI Jager**, & MJ Sale. 1996. Designing instream flows to satisfy fish and human water needs. *ASCE Journal of Water Resources Planning and Management* 122(5): 356-363.
- Jager HI**, DL DeAngelis, MJ Sale, W VanWinkle, DD Schmoyer, MJ Sabo, DJ Orth, & JA Lukas. 1993. An individual-based model of smallmouth bass reproduction and young-of-year dynamics in streams. *Rivers* 4: 91-113.
- Jager HI**, MJ Sale, & RL Schmoyer. 1990. Regional assessment of water quality in the Southern Blue Ridge Province using cokriging. *Water Resources Research* 26(7):1401-1412.
- Dale, VH, **HI Jager**, RH Gardner, & AE Rosen. 1988. Using sensitivity and uncertainty analysis to improve predictions of broad-scale forest development. *Ecological Modelling* 42:165-178.
- Jager HI** & RH Gardner. 1988. A simulation experiment to investigate food web polarization. *Ecological Modelling* 41: 101-116.