Peter N. Dudley, PhD

Curriculum Vitae

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My mission is to advance global environmental justice through my ecological research.
I will achieve this mission through sound, goal-oriented ecological research; the interweaving of physics, engineering, physiology, and ecology; and universally accessible and engaging outreach, while respecting animals, the environment, and individuals and weighing global and local concerns.

Professional Experience

***09/2021 – PRESENT*: Assistant Researcher, University of California, Santa Cruz & NOAA Fisheries**
***02/2015 – 09/2021:* Assistant Project Scientist, University of California, Santa Cruz & NOAA Fisheries**
Southwest Fisheries Science Center, Santa Cruz, CA

- PI of 8 person research group focused on anadromous fish conservation
- Developed models to assess effects of habitat alterations on 3 species of anadromous fish
- Developed an IBM for winter run chinook salmon
- Developed and validated salmon superimposition IBM
- Conducted fish egg computational fluid dynamics simulations with OpenFOAM
- Conducted quasi 3D flow molding of upper Sacramento with HEC-RAS 5.0
- Oversaw and conducted green sturgeon annual spawning census and population model
- Conducted scientific review for NOAA's green sturgeon 5-year review
- Developed integrated population models for green sturgeon population assessment

***08/2011 – 05/2014*: Biophysical Ecologist, Porter Research Group**
University of Wisconsin, Madison, WI

- Developed and coded terrestrial and aquatic biophysical ecological niche models in Fortran and MATLAB with NetCDF to analyze habitat sensitivity to climate change
- Constructed 3D animal models with CAD software
- Mathematically described and coded complex 3D animal movements in C
- Developed and ran 3D moving animal computational fluid dynamics simulations
- Created ecological Bayesian statistical models in R
- Planned and conducted field thermal imaging of leatherbacks in Panama/Florida

***05/2011 – 07/2011*: Field Research Assistant**
Missouri National Recreational River, SD

- Assisted in design and implementation of plot and transect sampling
- Performed woody plant ID and tree coring

***05/2009 – 05/2011*: Research Assistant, Mawst Research Group**
University of Wisconsin, Madison, WI

- Developed a laser spectral analysis program and graphical user interface in MATLAB
- Designed, grew and manufactured photovoltaic cells
- Designed an automated solar cell testing device in LabVIEW

***05/2006 – 06/2006*: Research Assistant, Applied Physics Lab**
Purdue University, West Lafayette, IN

***05/2004 – 08/2004*: Research Assistant, Physics Department, Creighton University**
CERN, Geneva, Switzerland and Brookhaven National Laboratory, Upton, NY

Selected Publications

(2023) P.N. Dudley, A.N. Hendrix, A.M.K. Osterback. A meta-analysis and model comparison of juvenile salmon growth across different habitat types, River Research and Applications 39 (2), 177-188
(2022) L.R. Harrison, C.J. Legleiter, V.K. Sridharan, **P.N. Dudley**, M.E. Daniels. Evaluating the sensitivity of multi-dimensional model predictions of salmon habitat to the source of remotely sensed river bathymetry, Water Resources Research, e2022WR033097
(2022) T.R. Nelson, C.J. Michel, M.P. Gary, B.M. Lehman, N.J. Demetras, **P.N. Dudley**, J.J. Hammen, M.J. Horn. Riverine fish density, predator – prey interactions, and their relationships with artificial light at night, Ecosphere, 13:e4261

(2022) P.N. Dudley, S.N. John, M.E. Daniels, E.M. Danner. Using decades of spawning data and hydraulic models to construct a temperature dependent resource selection function for management of an endangered salmonid. Canadian Journal of Fisheries and Aquatic Sciences, 79(1): 73-81.
(2021) P. Vick, S. Anderson, L. Krasnow, M. Goldsworthy, B. Meux, S. Wang, T. Coleman, & **P.N. Dudley**. Southern Distinct Population Segment of the North American Green Sturgeon (*Acipenser medirostris*) 5-Year Review: Summary and Evaluation.
(2021) P.N. Dudley, T.L. Rogers, M.M. Morales, A.D. Stoltz, C.J. Sheridan, A.K. Beulke, C. Pomeroy, M.H. Carr. A More Comprehensive Climate Vulnerability Assessment Framework for Fisheries Social-Ecological Systems. Front. Mar. Sci. 8.
(2020) B.T. Martin, **P.N. Dudley**, N.S. Kashef, D.M. Stafford, W.J. Reeder, D. Tonina, A.M. Del Rio, J.S. Foott, E.M. Danner. The biophysical basis of thermal tolerance in fish eggs. Proceedings of the Royal Society B: Biological Sciences 287.
(2019) P.N. Dudley. Insights from an individual based model of a fish population on a large regulated river. Environ Biol Fish, 102.
(2019) P.N. Dudley. S4: A spatially continuous, individual-based model of salmonid redd superimposition. Transactions of the American Fisheries Society, 148.
(2018) P.N. Dudley. A salmonid individual-based model as a proposed decision support tool for management of a large regulated river. Ecosphere, 9, 1.
(2016) P.N. Dudley, R. Bonazza, W.P. Porter. Climate change impacts on nesting and internesting leatherback sea turtles using 3D animated computational fluid dynamics and finite volume heat transfer. Ecological Modeling, 302.
(2014) P.N. Dudley, R. Bonazza, T.T. Jones, J. Wyneken, W.P. Porter. Leatherbacks swimming in silico: Modeling and verifying their momentum and heat balance using computational fluid dynamics. PLoSONE, 9, 10.
(2014) P.N. Dudley, W.P. Porter. Using empirical and mechanistic models to assess global warming threats to leatherback sea turtles. Marine Ecology Progress Series, 501.
(2013) P.N. Dudley, R. Bonazza, W.P. Porter. Consider a non-spherical elephant: Computational fluid Dynamics simulations of heat transfer coefficients and drag verified using wind tunnel experiments. J. of Experimental Zoology Part A, 319, 6.

Selected Awards, Honors, Grants

2022 Grant (co-PI): Drought Analysis and Decision Support Tools for Central Valley Chinook Salmon. CDFW. ($1,795,076)
2022 Grant (PI): Green Sturgeon Population Monitoring and Habitat Analysis. CDFW. ($905,870)
2021 Grant (PI): Update the Standard Assessment Methodology (SAM) Model. US Army Corps ($1,814,000)
2019 Grant (PI): Improving Green Sturgeon Population and Migration Monitoring. Delta Stewardship Council ($487,400) (Original PI: Ethan A. Mora)
2017 Grant (co-PI): UAS-based mapping of river bathymetry and water temperature to inform management of endangered, winter-run Chinook salmon. NOAA ($120,000)
2015 Best in Show, 2015 ANSYS Hall of Fame Competition, ANSYS Inc.
2014 Semifinalist, David H. Smith Conservation Research Fellowship, The Society for Conservation Biology
2013 Graduate Research Grant, University of Wisconsin, Zoology Dept.
2012 Summer Research Scholarship, University of Wisconsin, Zoology Dept.
2007 Outstanding Teaching Assistant, American Association of Physics Teachers

Education

2014 PhD, Zoology, University of Wisconsin, Madison
Dissertation: Turtles in silico: Using computational fluid dynamics to mechanistically niche model leatherback sea turtles.
2011 Master of Science, Materials Science, University of Wisconsin, Madison
Thesis: Development of an In0.3Ga0.7As Cell for use in Multijunction Photovoltaics
2008 Master of Science, Physics, Purdue University
2005 Bachelor of Science in Physics (Cum Laude), Creighton University

Specialized Training and Skills

Field skills
MOCC River jet boat operation, Transect and plot sampling, Wildlife handling and chemical immobilization, Wildlife thermography, Electrofishing, DIDSON, Side-Scan Sonar Fish Census
Computer skills (Programming languages)
R, JAGS (Bayesian statistics), NetLogo, FORTRAN, C/C++, MATLAB, Objective-C

Computer skills (Programs)

QGIS, MATLAB, Ansys (Fluent, DesignMolder, Meshing, CFD-Post), OpenFOAM, HEC-RAS, inSalmo, Salome

Lab Skills

Animal dissection, 3D and panoramic optical microscopy, Clean room techniques, X-ray diffraction

Teaching Experience

18 Semesters: Biology TA, Physics TA, and Physics Lecturer

Conservation Collaborations

2023 Green sturgeon status assessment team advisor
2021 Green sturgeon bycatch reduction team advison
2013 Sea Turtle Conservancy
2013 Loggerhead Marinelife Center, Inc