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Work History:

Self Employed

Current projects:

Maryland Power Plant Research Project – relicensing of Conowingo Project (FERC # 405) on the Susquehanna River and post-license studies at Holtwood (FERC # 1881) and York Haven (FERC # 1888) upstream of Conowingo. Principle areas of responsibility include: up- and downstream fish passage, telemetry data analysis, fish biology, habitat-flow analysis, and American eel passage.

Connecticut River Conservancy – relicensing of First light hydroelectric projects on the Connecticut River at Turners Falls (FERC # 1889) and the Northfield Mountain Pumped Storage Station (FERC #2485). Scoping began in 2012. First Light has filed its final license application. Reviewed study plans, study reports, IFIM review, shortnose sturgeon spawning flow needs analysis, and shad telemetry analysis. Participated in settlement talks with company, state and federal agencies, and NGOs.

SWCA, Inc. – Shortnose and Atlantic sturgeon habitat and protection plans for sewer line crossing construction on the Connecticut River, Springfield, Massachusetts.

Geosyntec consultants - Shortnose and Atlantic sturgeon habitat and protection plans for river bank stabilization on the Merrimack River, Haverhill, Massachusetts

Maine Rivers – relicensing of three projects on the Mousam River (FERC # 14856).

Kennebec Coalition – review and data analysis of downstream smolt radio telemetry studies (2012 – 2015) and the upstream fish passage plan at the Shawmut project on the Kennebec River (FERC # 2322).

Member of the Holyoke Cooperative Consultation Team for the Holyoke Hydroelectric Project (FERC #2004). Post-licensing downstream fish passage planning including configuration of the downstream passage protection structure, review of CFD analysis, analysis of telemetry data of American shad, shortnose sturgeon, and American eel during post licensing studies.

Santo Antônio , January 2010 to June 2011

TIRIS PIT tag installation, data analysis, and fish passage consultation for an experimental fish passage flume on the Rio Maderia, Brazil.

American Rivers, April 2010 to November 2011

Represented American Rivers for the relicensing of three projects on the Susquehanna River – Conowingo Dam, Muddy Run Pumped Storage Project and York Haven Dam. Participated in study plan development, reviewed study reports and prepared comment letters, attended meetings with the project owners, the FERC, state and federal agencies, and NGO's. Developed and independent analysis of American shad telemetry data at York Haven and Conowingo.

University of Massachusetts, Amherst MA January 1997 to January 2009

Research Assistant in the Department of Natural Resource Conservation working at the

Silvio Conte Anadromous Research Center – areas of research included the behavior and movement of adult Atlantic salmon in the Westfield River in Massachusetts using radio telemetry, upstream passage of sturgeons and riverine fishes in a spiral fishway, spawning behavior of shortnose sturgeon in an artificial 'stream, and downstream passage of sturgeons at a bar rack and louver system with a low level bypass entrance.

Massachusetts Cooperative Fisheries and Wildlife Research Unit, University of Massachusetts, Amherst MA
March 1991 to January 1997

Project Leader for Anadromous Fish Investigations project. Duties include: hire and supervise technicians staffing the Holyoke, Turners Falls, and Westfield River fish passage facilities; conduct recreational angler creel surveys, Atlantic salmon habitat assessment, and juvenile growth and survival estimates; supervise stocking of Atlantic salmon fry for the Connecticut River basin in Massachusetts; coordinate Unit operations with utility companies and state and federal agencies; and prepare budgets and reports.

Education:

Undergraduate

Trinity College
Hartford, CT 1967-71, B.A.
Major: History
Specialty: American History

Continuing Ed.

Greenfield Community College
Photography I, II & III, Fall 1980-81
Engineering Drawing, Fall 1978
Drafting for Engineers, Spring 1979
Programming Principles and Concepts, Fall 2002
Advanced Basic for Programmers, Spring 2002
Database Programming and Procedures, Spring 2005
Advanced Database Programming, Spring 2006

University of Massachusetts, Amherst

Principles of Management, Fall 1981
Microeconomics, Fall 1980
Macroeconomics, Spring 1981
Social Conflicts and Natural Resources, Spring 1991
Biological Limnology, Fall 1991
Anadromous Fish, Fall 1991
Biostatistics, Fall 1991
Intermediate Biostatistics, Spring 1992
GIS, Spring 1992
Population Dynamics, Fall 1992
Animal Movement and Migration, Fall 1992
Coastal Zone Management, Spring 1993
Ichthyology, Fall 1993
Principles of Fisheries Stock Assessment, Spring 1994
Aquatic Invertebrates, Fall 1994
Freshwater Fisheries Management, 1997
Inland Fisheries Management, Spring 1999
Imaging in Fisheries Science, Fall 2000
Natural Resource Modeling, Spring 2001

American Fisheries Society Workshops

Fish Ageing, 1995
Stream Habitat Assessment, 1996

USFWS - National Education and Training Center
Principles and Techniques of Electrofishing, 1996

DOI-USGS – Motorboat Operator Certification Course, 2000

Certified S.O. Conte Anadromous Research Center dive team member

S.O. Conte Fish Research Projects:

Atlantic salmon behavior and movements in the Westfield River, Massachusetts 1996 to 1998 – wild adult Atlantic salmon returning to the Westfield River were internally radio tagged and released into the upper Westfield River. Fish were tracked with fixed stations and with manual tracking. Movement, habitat choice, spawning, and post-spawning behavior were evaluated. Domestic broodstock Atlantic salmon were also radio tagged and released to assess their spawning potential to contribute to the salmon restoration effort in the Connecticut River basin.

Spiral fishway 2001 to 2007 – evaluation of a spiral, side baffle fishway designed for upstream sturgeon fish passage. Sturgeon, a benthic fish, need a fishway that allows upstream movement while maintaining close proximity to the bottom of the fishway. The spiral uses side baffles to reduce velocity and provide depth allowing fish to move in a sinusoidal curve along the bottom of the channel. Sturgeon movement was evaluated with a PIT tag system detecting fish at the entrance and exit of the fishway and at four points along each of two loops. Riverine fish were also evaluated in the spiral fishway.

Shortnose sturgeon spawning behavior 2002 to 2008 – the spawning behavior of wild Connecticut River shortnose sturgeon was evaluated in an artificial stream. Mating behavior, mate choice, velocity preference, egg to larvae survival, and embryo and larval dispersal timing were evaluated.

Downstream passage and behavior studies of shortnose sturgeon 2004 and 2005 – yearling, juvenile and adult shortnose sturgeon were evaluated for swimming depth, behavior at and movement along a bar rack, entrainment and impingement, and willingness to enter an opening in the bar rack at three different approach velocities. Pressure sensitive (depth) and radio tags were used to assess swimming depth for both upstream and downstream movement in a 20' by 120' flume with a velocity of 1 ft/sec. PIT tags and video were used to assess individual fish movement and behavior at a bar rack oriented 90° to flow at velocities of 1, 2 and 3 ft/sec.

Downstream movement of yearling shortnose sturgeon 2004 and 2006 – yearling shortnose sturgeon (Connecticut River stock in 2004 and Savannah River stock in 2006) were evaluated in a large outdoor oval channel with a river stone substrate to determine the timing, frequency and duration of upstream and downstream movements. Fish were tested for 48 hours on a monthly basis from June through November. PIT tags and five antennas were used to determine movement.

Low level orifice use of sturgeon at an angled bar rack and louver 2006 to 2008 – green, lake, Savannah and Connecticut River shortnose sturgeon of different year classes were tested in a 10' by 120' flume at two bar rack angles (45° and 30°) and one louver angle (26°) with two velocities at the orifice. Approach velocity (2 ft/sec) and water depth (7.5') remained constant for all trials. Fish were tested both day and night. Video and PIT tags were used to determine individual fish movement, behavior at the bar rack and passage through the orifice and pipe which transported fish downstream to a holding area.

Past Relicensing Projects:

Bear Swamp Hydroelectric Project – FERC # 2669

Relicensing of project through the ILP.

Deerfield River Project – FERC # 2323, License issued 1997

Deerfield River Compact – precursor to relicensing, all stakeholders in relicensing, including New England Power Co., met on a regular basis to discuss issues. Final report issued.

Deerfield River Settlement – followed the conclusion of the Deerfield River Compact with similar discussions as to the issues involved in relicensing with the goal of reaching agreement on environmental mitigation prior to issuing or license. Represented Trout Unlimited in

meetings with state and federal agencies, New England Power Co. and other NGO's which reached an agreement that was incorporated into and was the basis of relicensing by the FERC.

Holyoke – FERC # 2004, Connecticut River

Relicensing of project – bypass minimum flows, downstream fish passage (salmon smolts, adult Atlantic salmon, American eels, clupeids, and riverine fish), upstream passage (adult Atlantic salmon, clupeids, American eels, and riverine fish) freshwater mussel protection, flow priorities (bypass reach, canal, up- and downstream fish passage, hydrogenation, run of river protection of federally threatened tiger beetle), and disabled angler fishing access.

Comments to both company and the FERC concerning above listed issues.

Participant in CCT meetings representing Trout Unlimited concerning above listed issues. CCT consists of Holyoke Gas & Electric (project owners), state and federal agencies, and NGO's (Trout Unlimited and Connecticut River Watershed Council).

Indian River – FERC # 12462, Westfield River

Licensing of project – bypass minimum flows, freshwater mussel protection, downstream fish passage (salmon smolts, adult Atlantic salmon, American eels, riverine fish), upstream passage for American eels.

Participation in ongoing fish passage discussions regarding both up- and downstream passage issues.

L.S. Starrett Co. – FERC # UL09-01, Millers River

Installation of new turbine initiated local Conservation Commission and Massachusetts Department of Environmental Protection actions presently on hold due to a FERC order of jurisdiction dated October 21, 2009.

Intervened in Massachusetts Department of Environmental Protection appeal by Starrett of a Superseding Order of Conditions.

Commented to the FERC concerning Starrett Motion for Stay of Order of Jurisdiction regarding downstream fish passage.

Muddy Run Pumped Storage Project – FERC # 2355, Susquehanna River. Contracted by Maryland Power

Plant Project to provide biological and fish passage assistance during relicensing and post licensing. Principle issues are entrainment and the impact of the project on river flows.

New Home Dam Project – FERC # 6096, Millers River

Post licensing flow issues - run of river requirement.

Northfield Mountain Pumped Storage Project – FERC # 2485, Connecticut River

License amendment allowing more storage in upper pond. River bank erosion concerns.

Amendment application withdrawn.

Woronoco – FERC # 2631, Westfield River

Relicensing of project and 401 certification – bypass minimum flows, freshwater mussel protection, downstream fish passage (salmon smolts, adult Atlantic salmon, American eels, riverine fish), upstream passage for American eels, and recreation issues.

Analyzed telemetry data from downstream smolt test to provide independent review of results.

York Haven – FERC # 1888, Susquehanna River

Contracted by Maryland Power Plant Project to provide biological and fish passage assistance during relicensing. Relicensing is currently involved in settlement discussions with project owner, Olympus Power. Principle issues are up- and downstream fish passage for American shad and American eel and bypass flows.

Publications:

Kynard, B., D. Pugh, and T. Parker. 2003. Development of a fish ladder to pass lake sturgeon. Great Lakes Foundation, Final Report, Lansing Michigan.

Kynard, B., M. Horgan, D. Pugh, E. Henyey and T. Parker. 2008. Using juvenile sturgeon as a substitute for adults: a new way to develop fish passage for large fish. American Fisheries Society Symposium 61: 1-21.

Kynard, B., M. Kieffer, E. Parker, D. Pugh and T. Parker. 2012. Lifetime movements by Connecticut River sturgeon. In Life history and behavior of Connecticut River shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., D. Pugh, and T. Parker, M. Kieffer. 2012. Spawning of shortnose sturgeon in an artificial stream: adult behavior and early life history. In Life history and behavior of Connecticut River shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., D. Pugh, and T. Parker. 2012. Passage and behavior of Connecticut River shortnose sturgeon in a prototype spiral fish ladder with a note on passage of other fish species. In Life history and behavior of Connecticut River shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., E. Parker, D. Pugh, and T. Parker. 2012. Downstream and Diel Movements of Cultured Yearling Pallid, Green, Lake, and Shortnose Sturgeons: An Artificial Stream Study. In Life history and behavior of Connecticut River shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., D. Pugh, and T. Parker. 2004. Experimental Studies to Develop Guidance and a Bypass for Shortnose Sturgeon at Holyoke Dam. Final Report to City of Holyoke, Holyoke Gas & Electric Company, Holyoke, Massachusetts.

Kynard, B., D. Pugh, and T. Parker. 2005. Experimental Studies to Develop Guidance and a Bypass for Shortnose Sturgeon at Holyoke Dam. Final Report to City of Holyoke, Holyoke Gas & Electric Company, Holyoke, Massachusetts.

Kynard, B., E. Parker, D. Pugh, and T. Parker. 2007. Use of laboratory studies to develop a dispersal model for Missouri River pallid sturgeon early life intervals. J. Appl. Ichthyol. 23: 365–374.

Kynard, B., D. Pugh, and T. Parker. 2011. Passage and behavior of cultured lake sturgeon in a prototype side-baffle ladder: I. ladder hydraulics and fish ascent. J. Appl. Ichthyol. 47 (Suppl. 1): 1-12.

Pugh, D., B. Kynard. 2001. Westfield River adult salmon report Westfield River, Massachusetts, 1966 – 1968. Final report to United States Forest Service and United States Fish and Wildlife Service.

Pugh, D. 1997. Millers and Chicopee River Basins Mussel Survey. Report to Massachusetts Natural Heritage and Endangered Species Program.

Pugh, D. 1998. French and Westfield River Basins Mussel Survey. Report to Massachusetts Natural Heritage and Endangered Species Program.

Pugh, D. 1999. Blackstone, Quinebaug, and Quabog River Basins Mussel Survey. Report to Massachusetts Natural Heritage and Endangered Species Program.

Pugh, D and A. Haro. 2000. Passage of Atlantic salmon at Turners Falls fishways: PIT tag evaluation 1999. Conte Anadromous Fish Research Center Internal Report No 00-02.

Pugh, D. 2000. Merrimack, Ipswich, Charles, and Neponsett/Weymouth/Weir Basins Mussel Survey. Report to Massachusetts Natural Heritage and Endangered Species Program.

Pugh, D. 2001. 2001 Fort River dwarf wedge mussel (*Alasmidonta heterodon*) survey. Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program.

Pugh, D. 2002. 2002 Fort River dwarf wedge mussel (*Alasmidonta heterodon*) survey. Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program.

Presentations:

Movement and Habitat of Atlantic Salmon in the Westfield River. D. Pugh. Connecticut River Atlantic Salmon Commission Conference, 1999.

Zebra Mussels: Can We Stop The Eastward Invasion? M. Babione and D. Pugh. Northeast Fish and Wildlife Conference, 2003.

Passage of Sturgeons and Riverine Fishes in a Prototype Spiral Fish Ladder. B. Kynard, D. Pugh, T. Parker. American Fisheries Society Meeting, 2006

Behavior of Lake, Pallid, and Shovelnose Sturgeons at Passage Structures: Toward a New Paradigm in Developing Fish Passage. B. Kynard, M. Horgan, D. Pugh, E. Henyey, and T. Parker. American Fisheries Society Meeting, 2006.

Performance of Lake Sturgeons and Riverine Fishes in a Spiral Side-Baffle Fish Ladder. B. Kynard, D. Pugh, T. Parker. Connecticut River Atlantic Salmon Commission Conference, 2009.

Review of Using a Semi-natural Stream to Produce Young Sturgeons for Conservation Stocking. B. Kynard, D. Pugh, T. Parker, M. Kieffer. International Sturgeon Society Conference, 2009.

Up- and Downstream Passage and Behavior of Lake and other Sturgeons. D. Pugh B. Kynard and T. Parker. Keeyask Fish Passage Workshop, 2011.

Eel Passage Westfield & Millers Rivers, Massachusetts. D. Pugh. ASMFC Eel Passage Workshop, 2011.

Passage and Behavior of Cultured Lake Sturgeon in a Side-Baffled Fish Ladder: II. Fish Ascent and Descent Behavior. NAC. 2011.

Behavior, impingement, and entrainment of shortnose sturgeon at a vertical bar rack: with and without a bypass orifice. B. Kynard and D. Pugh. Fish Passage Conference, Amherst, MA. 2012.

Research on Up-and Downstream Passage of Lake Sturgeons at S. O. Conte Anadromous Fish Research Center. B. Kynard, D. Pugh, E Henyey, T. Parker and M. Horgan. *Scaphirhynchus* Conference: Alabama, Pallid, and Shovelnose Sturgeon Symposium, St. Louis, Missouri, January 2005

Shortnose Sturgeon Life History Requirements and the Holyoke Dam. B. Kynard, M. Kieffer, D. Pugh. Connecticut River Atlantic Salmon Commission Conference, March 2013